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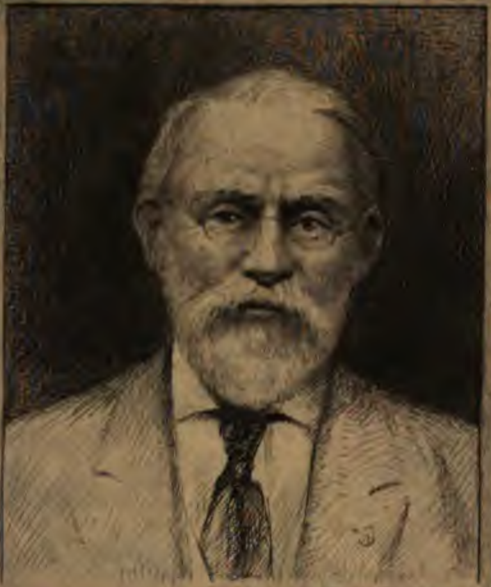

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A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

(TENTHREDO, SIREX AND CYNIPS, *Linné.*)

VOL. II.

BY

PETER CAMERON.

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PREFACE.

The present volume is devoted to the *Nematina*, possibly the most difficult group in the entire family; and, as will be seen, it contains the largest genus, namely, *Nematus*. The number of species recorded compares very favorably with what is known elsewhere; but I am persuaded that very many species have yet to be discovered in Britain, especially in the North, where they appear to be most numerous Might I therefore express the hope that some of our Entomologists would pay attention to these interesting insects, and thus enable me to describe many additional species in the concluding volume of this work. Especially is it desirable that they be reared from the larvæ; for in *Nematus* many species are excessively alike in the perfect state, although quite distinct as larvæ. Thus, if they be reared from the larvæ, not only will our knowledge of their habits be increased, but the specific distinctions will be more clearly defined. I regret that I have not been able to figure more of the larvæ, but living as I do in a large city, both the getting and the rearing of the larvæ is a work of difficulty.

04-18-36 MLW

The phenomenon of Parthenogenesis, now known to be of common occurrence with Sawflies, is a subject well worthy of extended study, and one which, if our knowledge of it were sufficiently comprehensive, might throw light on physiological problems of the highest importance.

My third volume will contain the remainder of the Tenthredinidæ, the Siricidæ, and the introductory part of the Cynipidæ, including a discussion on the phenomena relating to the structure and growth of galls in general. The fourth (and concluding) volume will deal with the systematic portion of the Cynipidæ.

I have again to thank my correspondents for their kind assistance, and have also to express my indebtedness to the Rev. Prof. T. Wiltshire, M.A., F.L.S., F.G.S., and Mr. R. McLachlan, F.R.S., for having looked over the proofs.

MANCHESTER;
January, 1885.

A MONOGRAPH

OF THE

BRITISH

PHYTOPHAGOUS HYMENOPTERA.

VOL. II.

TENTHREDINIDÆ.

Tribe (*sub-family*) NEMATINA.

In this tribe the antennæ are 9-jointed, the third and fourth joints subequal, the third rarely longer than fourth, usually slender and longish, often thicker, shorter, and more compressed with the males. Generally there is only one radial cellule, but there are two in *Dineura* and *Hemichroa*; there are either three or four cubital cellules, of which the second and third receive each a recurrent nervure in *Cladius*, and the first both in one section of *Nematus* (= *Pristophora*), or the second both with the most of the species, the second also receiving both in *Camponiscus*. The lanceolate cellule is contracted in *Cladius* and *Camponiscus*, petiolate in the other genera. In the hind wings there are always two median cellules, and the accessory nervure is appendiculated a little beyond the middle. The transverse basal nervure is always received at a distance from the cubital. The body is elongated as a rule, the abdomen becoming narrowed towards the apex; its cerci are usually long. The spurs seldom reach to the middle of the metatarsus.

The larvæ have never more than twenty legs. In form and habits they differ much. The cocoon is either single or double; the pupa offers no striking peculiarity.

This is a very extensive sub-family. It is more especially characteristic of the northern parts of the Palæarctic and Nearctic regions; and the species decrease very much from the north to the south of these zones. In fact, the only species known beyond them is one from Chili, which has been referred doubtfully to *Dineura*, and another also doubtfully referable to *Dineura*, is known from Sierra Leone.

The relations of the group to the *Tenthredina* have been already discussed (*cf.* vol. i, p. 64, and p. 185). By Thomson three genera are recognised, namely, *Nematus*, *Cladius*, and *Leptocercus* (= *Hemichroa*), by Zaddach six, *Nematus*, *Euura*, *Camponiscus*, *Cladius*, *Dineura* and *Hemichroa*, while by other authors, in addition to these, *Crœsus* and *Pristophora* are separated from *Nematus*, *Trichiocampus* and *Priophorus* from *Cladius*, and *Mesoneura* from *Dineura*. *Epitactus*, Foer. (Verh. pr. Rhein., 1854, p. 435), is in all probability only an aberration; it merely differing from *Nematus* in the third cubital cellule receiving one of the recurrent nervures, a form of neuration which occurs with many *Nemati* that have the second recurrent nervure interstitial, *e.g.* *N. capreæ.*[*]

The genus *Diphadnus*, Hartig (Blattw., 225), has only two cubital cellules, the body compressed, oval, and *Selandria* - like. I have examined a German example of *D. fuscicornis*, and am inclined to believe that the absence of the third transverse cubital nervure may not be constant. In general structure and coloration the species comes very near to *N. appendiculatus*, and the form of the abdomen is very similar to what exists with *Dineura despecta*. An examination of a large number of specimens can alone settle the affinities of the group. *Cf.* also Stein, Ent. Nach., vii, p. 63.

For reasons stated further on I adopt seven genera, and these may be separated as follows:

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[*] An analogous case occurs in species of *Hylotomina* and in some *Selandriades*, *e.g.* *Selandria sixii.*

1 (4) Fore wings with two radial cellules.
2 (3) Lanceolate cellule contracted. *Hemichroa.*
3 (2) Lanceolate cellule petiolate. *Dineura.*
4 (1) Fore wings with one radial cellule.
5 (8) Lanceolate cellule contracted.
6 (7) Fore wings with the first transverse cubital nervure generally obsolete, second (or first if the transverse cubital nervure is absent) and third receiving each a recurrent nervure. *Cladius.*
7 (6) Fore wings with the first transverse cubital nervure distinct, second cellule receiving both recurrent nervures. *Camponiscus.*
8 (5) Lanceolate cellule petiolate.
9 (10) Posterior tibiæ at apex and base of tarsi compressed and dilated. *Crœsus.*
10 (9) Posterior tibiæ and tarsi not compressed or dilated.
11 (12) With three or four cubital cellules, of which the first is large and receives both recurrent nervures if there are only three cellules, and the second if four cellules are present. *Nematus.*
12 (11) With three cubital cellules, of which the first is always small and the second receives both recurrent nervures. *Euura.*

Genus—HEMICHROA.

Hemichroa, Ste., Ill., vii, 55 (1835).
Leptocerca, Htg., Blattw., 228 (1837).

Wings with two radial and four cubital cellules, the second of the latter the longest and receiving both recurrent nervures. Lanceolate cellule constricted. Posterior wings with two middle cellules.

Antennæ longish, filiform; the third and fourth joints equal in length. Calcaria as long as half the metatarsus. Cerci long, stout. Clypeus incised at the apex.

The mandibles are weak; the apical tooth longer than one half of the total length, and moderately sharply pointed. The labial palpi are of moderate length, thickish, the first joint the shortest, the third is a little longer than it, and shorter than the second and fourth; the basal joint of the maxillary palpi is a little more than half the length of the second, and about one half shorter than fourth, which is longer than it, but shorter than the last two, which are the longest and, as well as the fourth, are thinner than the basal three joints; the last is a little shorter than the preceding. The inner lobe of maxilla is broad at the base and tapers to a sharp and long point at the apex, and reaches close to the top of the outer, which is broadly rounded on the top. The cardo is triangular, and one fourth longer than the mentum, which is broadest at the top.

The saw is strongly built, has broad, long, and sharply projecting teeth and strong cross bars. The support has also cross bars and is likewise strongly built.

So far as is known the larvæ are cylindrical and green or reddish in coloration; the eggs are laid in the twigs of the food plants.

The males are unlike the females in coloration; both the males of the two British species having the body quite black, and the legs reddish. With our species they are very rare, and both are freely parthenogenetic, the unfertilized eggs yielding either males or females.

Hemichroa is most nearly related to *Dineura* and *Camponiscus;* from the former it is known by the constricted lanceolate cellule; from the latter by its possessing two radial cellules.

The genus is of small extent, there being only three European and two North American species. One of our species (*rufa*) is found also in North America.

Synopsis of Species.

1 (2) Abdomen black, tibiæ black. *Alni.*
2 (1) Abdomen red, tibiæ white. *Rufa.*

1. HEMICHROA ALNI.

Vol. I, Pl. XIV, fig. 8 ♀; Pl. XXI, fig. 8, Saw. Vol. II, Pl. VIII, fig. 2, Larva; Pl. XXVII, fig. 1, Trophi of Larva.

Tenthredo alni, **Lin., Fn., Sv., 1571; S. N. (2), 925, 29; Fab.,**
E. S., ii, 115, 39; Fall., Acta, 1808,
109, 46; Schaef., Ic., pl. 110, figs. 6, 7;
Réaum., Mém., v, pl. ii, figs. 1, 2 (lar.);
Lep., Mon., 129, 391.
— *australis,* Lep., Mon., 71, 217.

Nematus alni, Dbm., Clavis, 25, 26 (lar.).
Hemichroa alni, Ste., Ill., vii, 55, 1, pl. xxxviii, fig. 2; Smith, Ent. Ann., 1864, 113; Cam., Fauna, 27, 1; André, Species, i, 94; Cat., 11,* 1.
Dineura — Htg., Blattw., 228, 6; Evers., Bull. Mosc., xx, 22, 4; Voll., Tijd. Ent., viii, 84—88, pl. v; Tasch., Hymen. Deut., 23; Kalt., Pfl. 620.
Leptocercus — Thoms., Hym. Sc., i, 77, 1; Brischke., Beob. ü. Blatt. u. Holzwesp. (2), 38, Taf. i, fig. 11 (lar.).

Black, covered with white pile. Head, mesonotum with scutellum, anterior tibiæ and tarsi red; palpi pale; cerci large, pale red; mandibles brownish. Wings hyaline; lanceolate cellule clouded; nervures, costa, and stigma black.

The ♂ has the antennæ brownish on the under side, the thorax without any red; the legs reddish-yellow, black at the base; wings smoky; anal appendages reddish; the apical abdominal segments piceous in the middle, with the apex slightly incised.

Length 3½—4 lines.

Ab.—*a.* ♀ Antennæ reddish, except at the base.
b. „ Wings infuscated throughout.
c. „ with smoky blotches.

The larva lives usually on the alder, but I have also bred it from birch. The eggs are laid on the leaf stalk, and the larva lives singly, or at most in twos or threes on the leaf, eating irregular holes in the surface, leaving the veins untouched. When young it is green, except that the head is darker. When mature the head is reddish, or dark reddish-brown; the eye spots black, and the mouth brown. The upper part of the body is dark green, the skin rugged and somewhat obscured with black; the lower part is bright green; often it is pale, almost white. The segmental divisions are well marked. The legs are green, with a tinge of red; the claws brown, claspers green. When full fed and about to pupate, it becomes pale green, pale orange on the first and on the two or three anal segments.

The cocoon is spun in the earth; it is single, oblong, and dark brown. The pupa is green. *Monoblastus erythropygus*, Hlm., and *Cteniscus sexcinctus*, Gr., are its parasites.

Two broods occur in England; but I believe there is, as a rule, only one in Scotland.

The difference between the two sexes is very great, that in the coloration of the legs being especially noteworthy. The ♂ is exceedingly rare. I have reared females from eggs laid by virgin females.

Common all over Britain; the imagos appearing first in May and early in June.

Continental distribution: Sweden, Denmark, Holland, France, Switzerland, Germany, Russia.

2. HEMICHROA RUFA.

Vol. I, Pl. III, fig. 3, Larva.

Tenthredo rufa, Pz., F. G., lxxii, fig. 2; Klug., Berl. Mag., viii, 82, 71; Lep., Mon., 117, 341.
Hemichroa — Ste., Ill., vii, 55, 2; Cam., Fauna, 28, 2; André, Species, i, 85; Cat., 11,* 2.
— *stigma*, Ste., l. c., 56, 3.
Dineura rufa, Htg., Blattw., 228, 7; Voll., Tijd. Ent., viii, 89—93, pl. vi; Ent., 1872, 19, (l. h.); Kalt., Pfl., 608; Stein, Ent. Nach., 1879.
Leptocercus rufa, Thoms., Hym. Sc., i, 77; Br. and Zad., Beob. Blattw. u. Holz. (2), 39, Taf. i, fig. 12 (lar.).

Reddish; antennæ, labrum, breast, metathorax, coxæ for the greater part, anterior tarsi at the apex, and the whole of the posterior with the apex of posterior tibiæ, black; clypeus, apex of anterior femora, and tibiæ at base, pale white. Wings smoky, hyaline at the apex; costa fuscous; nervures and stigma black. ♀

Length 2—4 lines.

The only aberration I have noticed (except a slighter or deeper intensity in colour) is a very small specimen bred from a larva found at Bishopton in June on birch, the imago appearing in August, after having pupated in a cork. It is scarcely two lines in length, the body is almost black, and very shining, scarcely a trace of the usual red being visible; the wings intensely black, except at the apex, which is lighter in tint. The transverse radial nervure is absent.

The ♂ is certainly very rare, and was only recently discovered, by Mr. J. E. Fletcher, who was fortunate enough to rear a few specimens. That gentleman (E.M.M., xviii, 126) induced virgin females to deposit eggs and reared males and females from them; and I have myself reared females from unfertilized eggs. The ♂ can scarcely be distinguished from that of *alni;* with the limited materials in my possession I have not been able to find any satisfactory characters whereby they can be separated. The wings vary in the intensity of the smoky tints, some specimens having them almost hyaline, and not darker at base than at apex.

H. unicolor, Rudow (S. E. Z., xxx, 218), I take to be a variety of this species, wanting the black on the legs and metanotum.

The larva is found on birch and alder. Five or six eggs are deposited in a leaf stalk, indifferently on either side. When young the head of the larva is of a shining pale brown, the intensity of which varies; eye-spots black; the rest of the body is pale green, save a black narrow stripe going down along the side over the spiracles; the second segment is pale yellow.

When full-fed the head is shining black, bearing a few pale hairs, and the mouth is pale. The second segment is pale orange, the rest greyish green. Above the spiracles is a black line, which extends to the penultimate segment. Over the legs are two black dots, separated from each other, and forming two bands. On each segment (especially noticeable on the back) are (in front) two tubercles, and behind these other four, each ending in a minute hair. The legs are greenish white, and before each is a V-shaped black mark; claws brown: the claspers are whitish. The last abdominal segments are paler than the rest. *Ctenisсus lituratorius*, L., is its parasite.

Unlike the larvæ of *H. alni*, six or seven of those of *rufa* live together on a single leaf, eating along the edge, or more rarely in the centre. As they increase in size, however, they are not so gregarious, especially on birch. The pupa is pale green; the cocoon is as in *H. alni.*

Somewhat rarer than *alni,* but of equally wide range in Britain. It is double brooded.

Continental distribution: Sweden, Holland, Germany, France, Hudson's Bay (North America).

Genus—DINEURA.

Dineura, Dbm., Comp., 5 (1835); Htg., Blattw., 226 (1837).
Mesoneura, Htg., l. c., 228.
Nematus, pt. Thoms., Hym. Sc., i, 80.
Pristis, Brullé, Hym., iv, 665 (1846).

Wings with two radial and four cubital cellules; the second of the latter is elongate, and receives both recurrent nervures, or the second recurrent may be interstitial (***Mesoneura***). Lanceolate cellule petiolate; posterior wings with two middle cellules.

Antennæ 9-jointed, the third and fourth joints subequal, longish, and filiform, or short and thick.

The typical species have the antennæ longer than the abdomen, filiform; the abdomen and the body generally is elongate, the cerci longish. The mandibles are longish, the apical tooth forming one-third of the total length, and has a bluntly rounded tooth at its base; the basal three joints of the maxillary palpi are thicker than the apical three, the second is nearly double the length of the first, and scarcely half the length of the third, which is longer than the fourth; the latter is a little shorter than the sixth; the fifth is the longest. The labial palpi do not vary much in length.

The second section has a thicker, shorter and stouter body-form; the antennæ are short and thick; and the transverse radial, third transverse cubital, and second recurrent are joined together = *Mesoneura.*

The larvæ of these two groups are sub-cylindrical, flat on the ventral surface, and feed on the flat surface of the leaf, eating usually only the epidermis. The cocoon is single and is spun in the earth.

The third group contains some small and little known species, which only agree with *Dineura* proper in the neuration of the wings. In other respects they agree better with *Blennocampa*, to which some of them have been referred by Thomson; but, as we are at present unacquainted with the larvæ of these small species, and as they differ from *Blennocampa* in the posterior wings having two middle cellules, as well as in the wider costal cellule (the costa not becoming dilated before the stigma as in *Blennocampa*), I have preferred to retain them in the meantime in *Dineura*. The mandibles are broader, thicker, the apical tooth much shorter and blunter; the palpi are shorter and thicker, and more like those of *Blennocampa* than of the typical species of *Dineura*.

The peculiarity in the neuration in *D. verna* I can only regard as specific; it is not even constant; sometimes the transverse radial is received in the third cubital cellule, at other times in the fourth, while the second recurrent may be received in the second or third cellules.

Twelve Palæarctic species of this genus are known; seven North American, and one doubtful species from Chili; to it also may, in all probability, be referred the West African *Xenapates africanus*. A curious thing about all the species is the irregularity in the position of the nervures, especially the transverse cubital and transverse radial; the former vary much in position and hence the size of the cellules varies, while the latter (especially in *stilata* and *testaceipes*) is often completely absent. When this happens they become practically *Nemati*, for I am not aware of any other character whereby they may be separated from *Nematus* than by the presence of the transverse radial nervure. Thomson, probably on this account, regards *Dineura* as merely a section of *Nematus*, but seeing how similar the larvæ are, and that it is after all only exceptionally that the transverse nervure is absent, I have preferred to keep it apart.

The absence so frequently of the transverse radial nervure in *D. stilata* is, from an evolutionary point of view, of much interest, for it shows us how "genera" have been formed. At present at least three-fourths of the specimens of *stilata* have only one radial cellule. In Prussia apparently all the specimens are in this condition, and in all likelihood in the course of some generations the transverse radial nervure will have disappeared, and then the species will require to be transferred from its present position in our systematic works to be arranged in *Nematus* among the species of the *pavidus* group. We find many similar instances in different groups—*Selandriades*, *Hylotomina*—of the partial or almost complete obliteration of the first transverse cubital nervure, as is shown by its being only present at the sides in many species of *Nematus*, or by its being only occasionally present in some species of *Hylotomina*. It is, therefore, quite clear that many of our so-called genera have been formed by certain nervures having been by some cause obliterated. I believe that cause to be the presence of of "bullæ" on the nervures. There is always a bulla on the transverse radial and first transverse cubical nervures; the effect of the presence of the bulla is that the nervure is divided in the middle, which makes it weaker, and also, no doubt, interferes with the circulation of fluid through it. If that be the case, then, such a nervure will be of little use to the insect, and not fulfilling any useful purpose will in course of time disappear entirely. That this is the explanation of the disappearance of many nervures found in some sawflies and not in others is proved by such nervures being always bullated. The cross nervure in the costal and lanceolate cellules are cases in point; and another one is that of the transverse brachial nervure of *Lyda*—a nervure only found in that genus. In some species it is well nigh complete, in others there is only a tiny branch to indicate its presence, and in a few species it has entirely disappeared. What may be the cause of the bullæ is a point which has not yet been clearly settled; it has, however, been suggested that they are caused by the manner in which the wings are folded in the pupa.

The case of *Dineura stilata* shows, too, how species apparently very similar may have had very different origins. Supposing we did not know its real affinities it would, as I have stated, be regarded as very closely related to *N. jugicola*, Thom. and *N. xanthogaster*, and regarded as a *Nematus*, I certainly think that is its proper position; but I scarcely think that these species may have been derived through descent from *stilata*. Still there is every reason for believing that *Nematus* has been derived from *Dineura;* in fact, the latter may even have given origin to the *Selandriades*, for remove one of the recurrent nervures in the hind wings of *D. verna* and most entomologists would consider it to be a *Blennocampa;* similarly, if *D. despecta* had only one or no median cellule in the hind wings, and if the first transverse cubital nervure were completely obliterated, I, for my part, would have no hesitation (especially seeing that it is a leaf miner as a larva) in considering its systematic position to be near *Fenusa.*

Synopsis of Species.

1 (2) Head, antennæ, thorax, and abdomen, for the greater part testaceous; transverse basal nervure received in front of the transverse costal. *Virididorsata.*
2 (1) Head and thorax for the greater part black.
3 (11) Transverse radial nervure not interstitial.
4 (7) Length over 2¼ lines; femora not black; antennæ brownish beneath; cerci long; transverse basal nervure interstitial.
5 (6) Abdomen for the greater part testaceous above; breast more or less yellow. *Stilata.*
6 (5) Abdomen entirely black above. *Testaceipes.*
7 (4) Length not over 2 lines; femora more or less black.
8 (9) Abdomen dull reddish at the sides and beneath. *Selandriiformis.*
9 (8) Abdomen entirely black; stigma fuscous, white at the base; transverse basal nervure received beyond transverse costal. *Simulans.*
10 (9) Stigma testaceous; transverse basal nervure interstitial. *Despecta.*

11 (3) Transverse radial and second recurrent nervures interstitial; transverse basal nervure received beyond the transverse costal; body ovate; thorax more or less marked with red; antennæ thick. *Verna.*

1. Dineura viridiDorsata.

Vol. I, Pl. III, fig. 4, Lar.; Pl. VI, fig. 12, Mandible of Lar.; Pl. XXI, fig. 7, Saw; Vol. II, Pl. XXVII, fig. 2, Trophi of Larvæ.

***Tenthredo viridi-dorsata*, Retz., Degeer, 73, 312; Degeer, Mém., ii, 266–7, 20, t. 38, figs. 8—10.**
— *ulmi*, Fall., Acta Holm., 1808, 123, 67.
— *Degeeri*, Klug., Berl. Mag., viii, 213, 169.
— *Geeri*, Ste., Ill., vii, 80, 25.
— *varius*, Lep., Mon, 69, 208.
***Dineura virididorsata*, André, Species, i, 90; Cat., 11,* 1.**
***Dineura Degeeri*, Htg., Blattw., 227, 1; Cam., Fauna, 27, 1; Br. and Zad., Beobach. ü. Blattw. (2), 31, Taf. i, fig. 9 (lar).**
— *Hartigii*, Gimmerthal, S. E. Z., v, 36 (1844).
***Nematus Degeeri*, Thoms., Hym. Sc., i, 80, 1; Cam., Sc. Nat., ii, 113 (lar.).**

Reddish-yellow; vertex, mandibles, more or less of meso- and metanotum, and dorsal surface of abdomen, black; apex of posterior tibiæ and joints of tarsi fuscous. Wings hyaline; costa and stigma pale-testaceous; nervures fuscous.

The ♂ has generally the meso-, metanotum, and the greater part of the dorsum of abdomen, black.

Length 3½—4 lines.

Ab.—*a.* Meso- and metanotum black.

b. Mesonotum with three black stripes; metanotum and apex of posterior tibiæ and tarsi black.

c. As in *b*, but metanotum yellow.

d. Abdomen entirely reddish-yellow.

e. Antennæ blackish.

The imagos appear towards the end of May and in June. The larvæ are found from August to October lying stretched on the upper surfaces of birch leaves, of which they eat the upper cuticle, thus leaving the leaf entirely white or with white blotches. Generally several are found on a leaf. In habits they are very sluggish.

The head of the larva is light shining green, with a yellowish tinge, which becomes more intense towards the end of the larva's active life; on the top are scattered short white hairs. The eye-spots black; mouth brownish; tips of mandibles black. The body is flattish; the thoracic region is broader than the abdomen; the colour is light green throughout, except that the segmental divisions are white. Legs glassy green, with brown claws, black at the tips. Generally the dorsal canal shines through as a darker green band.

The pupa state is passed in the ground, where the thin, black, oblong cocoon is spun. It remains unchanged till the beginning of May when it becomes a bright green pupa.

D. vivididorsata is an extremely common species in the birch woods in Scotland. In England it would seem to be somewhat rarer, but still equally widely distributed. It is a species which shows great colour variation, while the position of the nervures relative to each other (and consequently of the size of the cellules) is also very irregular. The transverse radial nervure is sometimes absent.

Continental distribution: Sweden, Germany, Holland, France.

2. DINEURA STILATA.

Vol. I, Pl. III, fig. 7, Larva; Pl. XIV, figs. 5 ♀, 5 *a*, Cerci. Vol. II, Pl. XIV, fig. 6, Saw.

Tenthredo stilata, Klug, Berl. Mag., viii, 72.
— ***mediocris***, St. Farg. et Serv., Enc. Méth., x, 570 (1825).
Nematus bicolor, Ste., Ill., vii, 27, 2 (ex type).
— ***apicalis***, Ste., Ill., vii, 32, 22 (ex type).
Selandria scapularis, Ste., Ill., vii, 46, 6.
Nematus posticus, Foer., Verh. pr. Rhein., xi, p. 349.
Dineura stilata, Htg., Blattw., 227, 2; Cam., E. M. M., xiii, 175; Fauna, 27, 2; André, Species, i, 92; Cat., 11,*2.
— ***flaveola***, Evers., Bull. Mosc., xx, 21.

Nematus stilatus, Thoms., Hym. Sc., i, 82, 3.
— *xanthopus*, Br. and Zad., Schr. Ges. König., 1875, Taf. iii, fig. 5; l. c., 1883, 323, 69.

Antennæ subsetaceous, longer than the abdomen, the first two joints half globose, third and fourth equal, the rest becoming a little shorter and thinner towards the apex; the basal two joints are black, the third and fourth have a black line above, their under sides and the remaining joints reddish. Head black, shining, covered with scattered pubescence; the sutures distinct, the front not much elevated. Clypeus emarginated at the apex, which, with the labrum, is white; the palpi are pale; mandibles reddish at the tips. Thorax black, shining; mesonotum finely punctured; the pronotum and a large spot on the pleuræ pale reddish; pleuræ somewhat opaque. Abdomen narrower than the thorax, luteous, the two basal segments above, and sometimes a mark on the apex, black; cerci longish, pale luteous; cenchri oval, pale white. Legs yellowish; coxæ and trochanters paler. Wings hyaline; nervures black; the costa and stigma sordid testaceous.

The ♂ has the thorax quite black; the abdomen luteous, black above at base and apex.

Length 2—2½ lines.

Ab.—*a.* ♀ and ♂. Wings with one radial cellule.

The neuration of the fore wings varies very much, especially as regards the position of the transverse radial and cubital nervures. In fact, as often as not the transverse radial nervure is absent, and this circumstance puzzles entomologists not a little until they become acquainted with the species.

Larva: head yellowish-green, covered sparsely with short white hairs. Mouth brownish. Body uniformly green, sometimes with a yellowish tinge on the back, which bears a microscopic pile. The sides over the legs covered with white hairs, moderately long and comparatively few in number. A narrow white line goes down the sides through the spiracles. At the last moult it becomes of a clearer green colour.

The larvæ feed on the upper side of the leaves of the hawthorn, eating only the upper epidermis. There are often two or three, or even more larvæ feeding on the same leaf; they are sluggish and give out a fetid odour. They are very similar to the larvæ of *D. testaceipes*, but the nasty smell which they give out enables them to be distinguished from the *Pyrus* feeder. I find them feeding from August to October. The flies appear in June, and are common and generally distributed in Britain. André, however, says the larvæ also feed on *Pyrus aucuparia*.

Continental distribution: Sweden, Germany, Russia.

3. DINEURA TESTACEIPES.

Vol. I, Pl. IV, fig. 1, Larva; Vol. II, Pl. XIV, fig. 7, Saw.

Tenthredo testaceipes, Klug, Berl. Mag., viii, 84, 75.
Dineura — Htg., Blattw., 227, 3; Evers., Bull. Mosc., xx, 21, 2; Cameron, E. M. M., xi, 251; Fauna, 27, 3; André, Species, i, 92; Cat., 11,* 3; Br. and Zad., Beob. ü. Blattw. (2), 34, 61.
— *ventralis*, Zad., Beschr., 10, fig. 3 (lar.).
Nematus testaceipes, Thoms., Hym. Sc., i, 84, 4.
Dineura stilata, Br. and Zad., Beob. ü. Blattw. (2), 33, Taf. i, fig. 10.

Black, shining; antennæ nearly as long as the head and thorax, thin, tapering very perceptibly towards the apex, the third and fourth joints nearly equal; on the under side they are testaceous. Head a little narrower than the thorax, slightly pubescent, sutures distinct, antennal foveæ large and moderately deep; clypeus incised at apex; the clypeus (except at base) and labrum, with palpi, pale white, except at apices of the joints, which are fuscous; mandibles dark brown. Thorax and sides of the breast smooth, shining; tegulæ, and a line on the pronotum, testaceous. Abdomen broad, a little flattish, expanded at the sides, sharply rounded at apex; cerci longish, testaceous; saw short, sheath hairy. Legs testaceous-yellow; coxæ and trochanters pale white; the tibiæ pale. Wings hyaline, with a brownish tinge; nervures black; costa and stigma sordid testaceous. The second cubital cellule is more than double the length of the third, and has a horny point at the anterior end; third small, dilated at the apex; the second recurrent nervure is received a little in front of the third cubital.

The ♂ has the antennæ brownish, with a black line above; the pronotum is entirely black; the back of the abdomen is black, except at the apex, which is widely emarginated; the posterior tarsi are fuscous.

Length 2¼—2¾ lines.

Ab.—*a*. Wings with one radial cellule.

From *D. stilata*, the present species may be known by having only a thin testaceous line on the pronotum, the pleuræ quite black, the abdomen shorter, wider, and more rounded at the apex, and the legs paler and marked with black at the base. The coloration of the abdomen varies; in one form it is quite black, in another the apex, sides, and belly are testaceous (var. *ventralis*, Zad.). The wings also have a decided brownish tinge in some specimens. Its ♂ may be known from the ♂ of *stilata* by the antennæ having a distinct black line above; the abdomen is also black on the back, while in *stilata* the antennæ and abdomen are only black at the base.

The larvæ are found in August and September on the under surface of the leaves of *Pyrus aucuparia*, on which they feed in the usual *Dineura* fashion. The anterior part of the body is broader than the posterior; the ground colour is a bright green, with a yellowish tinge; the back is darker and beset with short white hairs; the segments at the edges are whiter than the rest of the body; claws brown; the head is covered with short pile, yellowish, with black eye-spots and brownish mouth. At the last moult the hairs disappear, and the skin becomes yellower and shining. The cocoon is spun in the earth, the fly appearing in the following May and June.

D. testaceipes is a common species. I have it from many Scotch localities; from Northumberland; Worcester, and the London district.

Continental distribution: Sweden, Germany, France, Russia.

4. DINEURA VERNA.

Vol. I, Pl. XIV, fig. 4, ♀; 4 *a*, Mandible.

Tenthredo verna, Klug, Berl. Mag., viii, 55, 21.
— *punctigera*, Lep., F. Fr., pl. 7, fig. 6; Mon., 110, 318.
Selandria verna, Ste., Ill., vii, 47, 11.
— *biloba*, Ste., l. c., 54, 39.
Dineura opaca, Htg., Blattw., 229, 8.
— *pallipes*, Htg., l. c., 229, 9.
— *verna*, Giraud, Ann. Fr. (5), i, 386 (lar.); Cam., Fauna, 27, 4; André, Species, i, 93; Cat., 11,* 8.
— *opaca*, Br. and Zad., Beobach. ü. Blattw. (2), 37, 12, Taf. xi, fig. 3.
— *dorsalis*, Foer., S. E. Z., v, 262.

Nematus opacus, Thoms., Hym. Sc., i, 81, 2.
Selandria labialis, Brullé, Exp. Sc. de Morée, iii (1), pt. 2, 393, 872.

Black, shining, and thickly covered with griseous pubescence; clypeus at apex, palpi, and labrum white; pronotum, a large triangular spot on mesonotum, scutellum, a splash on side of the breast, and the abdomen at the apex beneath, ferruginous. Legs white, with a ferruginous tinge, the apex of coxæ and a line on the femora black. Wings hyaline, nervures black, costa and stigma pale testaceous. ♀.

Length 2¾—3 lines.

Ab.—*a.* Thorax (pronotum excepted) and abdomen (except anus) black; femora and posterior tarsi lined with black.

b. As in *a*, but scutellum ferruginous.

c. Meso- and metanotum ferruginous; abdomen entirely black.

d. Wings half developed, of equal breadth, the portion beyond the stigma being crumpled up; the stigma wrinkled and thick.

A species distinguished by its short, thick, Selandria-like body. The antennæ are short, thick, and a little longer than the head and thorax; the frontal sutures are small; the clypeus incised, but not very deeply; cerci short, and the saw does not project much.

The coloration of the thorax and abdomen varies considerably, scarcely two specimens having the same amount of the red colour, the thorax especially varying from black to ferruginous. The first radial cellule is small; the nervure arises a little past the middle of the stigma; the third cubital cellule is about one fourth smaller than the second; the third transverse cubital nervure has scarcely any slope. The position of the nervures is very inconstant; often the transverse radial nervure is absent; it is not always joined to the second transverse cubital, and the position of the transverse cubital nervures is also subject to variation.

The larva, according to Giraud, is found about the middle of May, and pupates at the end of that month. It is cylindrical, and a little thick, the colour throughout being a delicate green, with the exception of the eyes, which are black, and of the oral region, which is somewhat red. The body is glabrous, with deep transverse folds. The clypeus is truncated, straight; labium deeply incised, trifid, the middle portion small, the lateral longer, forming two rounded lobes. It walks in a straight line by resting on the anal end, but often, especially in repose, the end is turned under the belly. It feeds on the under surface of the leaves of the common oak.

The cocoon is small, sub-ovoid, very short, 7‴ long and 4‴ thick; its sides are rather fine, blackish, very finely reticulated on the outer surface, to which adhere grains of sand. It is spun in the earth.

As parasites Giraud mentions: *Mesoleius formosus*, Gr., *M. armillatorius*, Gr., *Polyblastus palustris*, Holm.? *Erromerus fasciatus*, Gr., and *Plectiscus tenthredinarum*, Giraud, the last mentioned being an external parasite.

A widely distributed species, but not very common anywhere, in May. I have seen it from Aberdeen, Clydesdale, Dumfriesshire, the London district, and Norwich.

Continental distribution: Sweden, Germany, Holland, France, Italy, Morea, Asia Minor.

5. DINEURA SELANDRIIFORMIS.

Dineura selandriiformis, Cam., E. M. M., xi, 252; André, Species, i, 91; Cat., 11*, 5.

Black; antennæ about the length of the head and thorax, moderately thick, the third and fourth joints nearly equal. Head black, faintly pilose; clypeus and labrum white. Thorax shining, shortly pilose; the pronotum almost entirely reddish; tegulæ white; cenchri scarcely visible. Abdomen of the length of the head and thorax, black above, the sides, extreme apex above, and belly dull reddish. Wings hyaline, costa and stigma fuscous, the former paler than the latter; the first cubital nervure is very faint, the third cubital cellule is longer than broad, widest at the apex. The transverse radial nervure is received a little in front of the middle of the third cubital cellule, the second recurrent a little in front of the second transverse cubital. Legs testaceous, the anterior femora at the base slightly, posterior entirely

(except at knees), the apical half of the posterior tibiæ and the posterior tarsi, black, the four anterior faintly fuscous. ♀.
Length nearly 2 lines.

Besides the differences in the position of the nervures *selandriiformis* is distinguished from *verna* by the first transverse cubital nervure being absent, the costa and stigma are fuscous, the antennæ are longer and thicker, the body less downy, the femora have more black, and the apical half of posterior tibiæ and the tarsi are black.

Taken in England by the Rev. T. A. Marshall. Possibly it is only a variety of *verna*.

6. DINEURA DESPECTA.

Vol. I, Pl. XII, fig. 4,[*] ♀.

Dineura despecta, Htg., Blattw., 228, 4; Evers., Bull. Mosc., xx, 21, 3; Kalt., Pfl., 9 (lar.); Cam., E. M. M., xiv, 156; André, Species, i, 93; Cat., 11,[*] 4; Br. and Zad., Beobach. ü. Blattw. (2), 36, 10, Taf. ii, f. 1 (lar.).
Tenthredo parvula, Kl., Berl. Mag., viii, 71, 51?
— *fuscula*, id., l.c., 70, 50?
Selandria fuscula, Ste., Ill., vii, 50, 24 (*nec* type).
Pelmatopus (*Dolerus*) *minutus*, Htg., Blattw., 244, 1; André, Species, i, 282; Cat., 35[*].
Dineura fuscula, Cameron, E. M. M., xi, 253.
— *parvula*, Htg., Blattw., 228, 15.
Blennocampa parvula, Thoms., Hym. Sc., i, 221.
— *fuscula*, Cam., Fauna, 26, 15.

Black; head covered with fine, close pubescence, vertex finely punctured; legs testaceous, the base of coxæ and the greater part of femora black; apex of abdomen above obscure brownish; mandibles piceous. Wings scarcely hyaline, with a faint brownish tinge; nervures, costa and stigma testaceous; tegulæ obscure testaceous; the transverse radial nervure is received a little in front of the third transverse cubital nervure; the second recurrent nervure is almost interstitial; the second cubital cellule is much longer than third, and has a horny point in apical half. The antennæ are longer than the abdomen, filiform; the third joint longer than fourth, the rest become gradually (and distinctly) shorter. The blotch is very broad, occupying three-fourths of the breadth of segment.
Length 2 lines.

The larva mines the leaves of *Ranunculus repens* in

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[*] Under the name of *fuscula*.

May and June, and a second time in September, forming a great, longish, deep brown spot in either corner of the leaf. It is 2—3‴ in length, bare, of almost uniform breadth, with flat ventral surface, and gently arched back. The colour of the body is yellowish, with a green dorsal canal; head flat, reddish-yellow, shining; the mouth and eye-spots brown. The thoracic legs are clear, bright yellow; the ventral legs are short and nipple-like; the sides of abdomen are indented with notched sinuations. Brischke (l. c.) describes the thoracic legs as brownish, and says there is between the legs on the belly a light brownish spot. There are twenty legs, but the ventral are but slightly developed, and the anal pair still less. At the last moult it becomes yellowish. Three larvæ may be found in a single leaf, and if that is not sufficient they creep into the leaf-stalk for food.

The pupa state is passed in the earth, the fly (which is very difficult to rear) appearing in April.

Not a common species. Clydesdale, London district (Healy), Devonshire (Parfitt).

Continental distribution: Sweden, Germany, Holland, France, Russia.

Obs.—This species is probably *Tenthredo fuscula*, Klug, which was regarded by Hartig as the ♂ of *Blennocampa pusilla*, but as *despecta* is a better known name I have preferred to adopt it. Zaddach (l. c.) does not give any description of *fuscula* although treating it as a distinct species: he merely quotes my remarks in Ent. Mo. Mag., xi, 253. I received on loan some years ago a specimen of the species Zaddach considered as *fuscula*, and it agreed in every respect with the specimen from Cadder Wilderness described above, including the neuration—it having only three cubital cellules. *D. parvula* was not seemingly known to Zaddach who quotes merely Klug's diagnosis.

7. DINEURA SIMULANS.

Dineura simulans, Cam., E. M. M., xiv, 155; André, Species, i, 91; Cat., 11,* 6.

♀ Black; antennæ filiform, nearly as long as the body, third and fourth joints equal, the remaining joints becoming gradually shorter and thinner. Head (especially on the vertex) very finely punctured, mouth white. Thorax half shining, bare, and finely punctured; scutellum raised, oval, shining, cenchri small, pale. The abdomen is of the length of the head and thorax, but is narrower, the apex mucronate; saw very large, black, and largely projecting. Legs white, femora lined with black above, pale fuscous at the sides; the apex of the posterior tibiæ and tarsi (except the last joint) fuscous. Wings hyaline, the costa and stigma pale; the last with the apex fuscous. The neuration is irregular in the only specimen yet found, but it does not differ essentially from that of *D. testaceipes.*

Length, scarcely 1¼ lines.

The whitish legs and half white half fuscous stigma will readily separate this little species from *despecta.*

It was taken in England by the Rev. T. A. Marshall; the exact locality is unknown to me.

Genus—CAMPONISCUS.

Leptopus, Htg., Blattw., 184 (*non* Latr.).
Camponiscus, Newman, Ent., iv, 215 (1869).
Leptocercus, Thoms., Hym. Sc., i, 78 (in part).

Wings with one radial and four cubital cellules, the second and third of the latter subequal, and the second receiving the two recurrent nervures; transverse basal nervure received between the transverse costal and the stigma and nearer the former; transverse median received a little beyond the middle of cellule. Lanceolate cellule contracted near the base. Posterior wings with two middle cellules. Antennæ filiform, the third joint a little shorter than the fourth.

The mandibles are moderately stout, the apical tooth long; there is no distinct subapical tooth. The palpi are long, the second joint of the maxillary is a little longer than the third, which is not much shorter than the fourth, the fifth is longer than the latter but shorter than the sixth. The basal three joints are thicker than the rest, the last is the thinnest. The inner lobe of the maxilla reaches to the top of the outer. The apical three joints of the labial palpi do not differ much in length. The clypeus is slightly incised; the calcaria are shorter than half the length of the metatarsus; the claws bifid.

From the *Nemati* with one radial cellule *Camponiscus* is easily known by the contracted lanceolate cellule, except from *Cladius*, which, however, is readily known from it by the second cubital cellule receiving only one of the recurrent nervures. Thomson treats *Camponiscus* as a subgenus of *Hemichroa*. As it is so easily known from all the *Nemati* by the neuration, and as the form of the larva is quite peculiar, I have preferred to keep it distinct. It is, so far as is known, confined to Europe (especially the north), and at present is represented by six species.

1. CAMPONISCUS LURIDIVENTRIS.

Vol. I, Pl. IV, fig. 2, Larva. Pl. XV, fig. 5,* ♀, 5 *a*, Antenna; Vol. II, Pl. XXVII, fig. 4, Trophi of Larva.

Tenthredo luridiventris, Fall., Acta Holm., 1808, 115, 55.
Nematus (*Leptopus*) *hypogastricus*, Htg., Blattw., 184, 1, pl. v, f. 41 (lar.).
Nematus luridiventris, Voll., Tijd. Ent., xiv, 276, pl. 12, *a—e*.
— *alnivorus*, Brischke, Abbild., 12, pl. iii, f. i (lar.).
Leptocercus luridiventris, Thoms., Hym. Sc., i, 84, 4; Br. and Zad., Beob. ü. Blattw. (2), 14.
Camponiscus Healæi, Newman, Ent., 1869, 215.
— *luridiventris*, Cam., Sc. Nat., ii, 151; André, Species, 96, pl. xiii, fig. 1; Cam., Fauna, 28, 1.
Leptopus rufipes, Foerster, Verh. pr. Rheinl., xi, 276, 15. For Larva: De Geer, Mém., ii, 268, T. 38, f. 11-13; Réau., Mém., v, t. 12, f. 17, 18; Dbm., Clavis, 36; Bouché, S. E. Z., 1846, 289.

Black, shining, covered with slight down; legs ochreo-testaceous, with the trochanters and tibiæ paler; posterior tarsi with apex of tibiæ fuscous. Wings infuscated, nervures and stigma fuscous; tegulæ reddish-brown. Edge of pronotum, palpi, and apical segments of abdomen beneath testaceous.

The ♂ has the antennæ longer and thicker, the pronotum entirely black, the anal segment fuscous.

Length 3—4 lines.

Some specimens I bred had a testaceous splash on the pleuræ.

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* Under the wrong name of *Cladius padi*.

The larva was described by Degeer and Réaumur under the name of the "larve cloporte." It feeds on the underside of alder leaves, eating irregularly-shaped holes between the principal veins, and generrally is found resting motionless, the body being pressed close to the leaf, with which it agrees closely in colour.

It is somewhat onisciform in shape, extremely flat, the back rounded, with the sides expanded, almost transparent and membranous. The head rises sharply from the back, is sharply depressed on the top, and the face generally slopes in the direction of the mouth, especially when the head is partly withdrawn within the overhanging folds of the second segment. It is green, with a tinge of yellow, and bears two light brown marks on the top, the mouth being of the same colour but deeper in hue, and the eye-spots are black. The legs are green, and are hid by the overhanging folds of the body. The body in the centre is of a beautiful dark shining green, with the sides paler, the segments being waved and fringed with long white hairs. On the third and following segments, except the last, are, at the juncture of the segmental divisions, two black, irregular marks placed above the flat sides, the one nearest the top being the largest. Another dot is placed between the second and third segments.

Length 5—6 lines by 1½—2 lines broad.

The larvæ are found between July and October; they pupate in the earth, spinning a dark cocoon of the usual shape. The pupa is green and appears in May. Parasites are *Mesoleius transfuga*, Hlm., and *M. leptogaster*, Hlm.

The species in this country is coextensive in its distribution with the food plant, while its range in Europe extends from France northward.

Genus—CLADIUS.

Cladius, Illiger, Rossi, Faun., Etr., ii, 27.
Trichiocampus, Htg., Blattw., 176.
Priophorus, Dbm., Consp., 4.

Wings with one radial and four cubital cellules; the first cubital small and usually confluent with the second which is rather long and broad, angled at the bottom where the recurrent nervure is received; third a little more than half the length of second, and receives a recurrent nervure in an angle; the fourth is the largest. Lanceolate cellule contracted towards the middle. Posterior wings with two recurrent nervures. Antennæ 9-jointed, filiform and simple in the ♀; third and fourth joints about equal in length; the former usually curved. In most species the joints are well produced at the apices. In one section in the males there are longish projections from the base of the third, fourth, and fifth joints, a second has a small projection from the base of the third, in a third section the joints are all simple.

The head is broader than long; the clypeus is small, incised at the apex, and in *C. viminalis* is minutely toothed; the labrum is semicircular. In the male the clypeus is narrower. The mandibles are curved, the apical tooth long, and there is a sharp subapical one. The basal portion is plain in *viminalis*, minutely toothed in *padi*. The basal joint of labial palpus is about one-fourth shorter than the second, the third about the size of the first, the fourth about the length of second. The first joint of the maxillary palpus is short and stumpy, second longer and thinner, third about three and a half times longer than second, fourth about the length of the second, fifth longer than the third, sixth about the same length as fifth in *padi*, in *viminalis* shorter than it.

The scutellum is flat, the cerci longish. The legs are moderate in size, the patellæ large, spurs shorter than one half of metatarsus. The saws are well developed, the sides beset with seven or more rows of stout irregular teeth, and mostly armed with stout transverse processes.

The egg is oval, white, and is as a rule deposited in the leaf-stalk. The larva cylindrical, with a roundish head; the skin beset all over with tubercles, usually arranged in definite order, each ending in a longish stiff hair. The head is also covered with long hairs. Its clypeus is large and irregularly heart-shaped. The mandibles stout and double toothed. The maxillæ have five-jointed, short, conical palpi, the inner is closely armed with bristle-like teeth, the outer lobe stumpy and crooked. The spinning vessels are placed close to the labium, which has three-jointed, short palpi. The legs are hairy, their claws are sharp, horny, and crooked; the penultimate joint at the apex projects outwards and forward over the preceding into an oval ball-like mass.

The usual colour of the larvæ is green or some modification of it, but one species is black and another orange. They frequent the under surface of the leaves, eating only the parenchyma at first, then irregular holes in them. Poplar, *Salix*, birch, and especially rosaceous plants are their principal food.

The cocoon is thin, double, irregular in shape, and almost transparent. It is spun in the earth, under bark, or in stems.

The fact of the second cubital cellule receiving only one of the recurrent nervures instead of both, as in *Nematus* and *Crœsus*, renders its recognition from these genera very easy. By many authors *Trichiocampus* and *Priophorus* are regarded as distinct genera, but inasmuch as the females of these sections, and *Cladius* proper, do not differ to any appreciable extent, I have not separated them because the males show some difference in the structure of the antennæ, and I am confirmed in this opinion by the larvæ being quite similar in form and in the mode of pupation in all the divisions.

Cladius is confined to the temperate regions of the New and Old Worlds. There are two European species of *Cladius* and one North American; seven European species of *Trichiocampus*, which seems to be confined to Europe; and four European and two North-American species of *Priophorus*.

Synopsis of Species.

Males.

1 (2) Antennæ with four long branches. *Pectinicornis.*
2 (8) Antennæ with a knob at the base of third joint.
3 (4) Abdomen luteous. *Viminalis.*
4 (5) Abdomen black.
5 (6) Legs reddish-yellow. *Rufipes.*
6 (7) Legs white. *Drewseni.*
7 (6) Knees, tibiæ and tarsi white. *Eradiatus.*
8 (2) Antennæ simple, compressed.
9 (10) Legs for the greater part white, wings hyaline. *Padi.*
10 (9) Only the knees, tibiæ and tarsi white, wings smoky at the base. *Brullæi.*

Females.

1 (2) Abdomen luteous. *Viminalis.*
2 (1) Abdomen black.
3 (4) Legs reddish-yellow. *Rufipes.*
4 (3) Legs more or less white.
5 (8) Legs white at the base.
6 (7) Third joint of antennæ curved, spurs not one-third of length of metatarsus. *Drewseni.*
7 (6) Third joint of antennæ straight, spurs reaching to near middle of metatarsus. *Padi.*
8 (5) Legs black at base, knees, tibiæ and tarsi white.
9 (10) Wings smoky at base; third joint of antennæ straight. *Brullæi.*
10 (9) Wings uniformly hyaline; third joint curved.
11 (12) Third, fourth, and fifth joints of the antennæ obliquely truncated and produced into a sharp point at the apices; tibiæ and tarsi yellowish-white. *Pectinicornis.*
12 (11) Apices of the antennal joints not obliquely truncated, tibiæ and tarsi white, more or less fuscous. *Eradiatus.*

SECTION I.

In the ♂ on the underside of the third joint at the base is a small knob-like projection; at its apex on the upper side is a branch-like prolongation nearly as long as the segment itself; on the fourth, fifth, and sixth are similar processes, each gradually decreasing in length; the seventh is a little pointed upwards at the apex, the last joint is almost awl-shaped. In the ♀ the joints become gradually shorter and thinner; the third is bent beneath, and the fourth—sixth have their apices obliquely truncated and the upper edges produced into sharp spine-like projections. In the ♂ the joints are densely, in the ♀ only slightly, pilose. Cerci long; calcaria a little shorter than them. Head densely covered with a fuscous pile =*Cladius.*

1. CLADIUS PECTINICORNIS.

Vol. I, Pl. XV, fig. 1, ♂ ; 2 ♀. Vol. II, Pl. VIII, fig. 1, 1 *a*, Larva ; Pl. XIV, fig. 4, Saw.

Tenthredo pectinicornis, Fourc., E. P., ii, 374, 33.
— *difformis*, Pz., F. G., Heft 62, pl. 10.
Lophyrus difformis, Spin., Ins. Lig., ii, 153; Fall., Acta, 1808, 41, 5, 6; Mon., 18, 9.
Cladius difformis, Lep., Mon., 58, 165; F. Fr., pl. 12, f. 4; Brullé, Ann. Soc. Ent. Fr., i, 308, pl. xi, f. 10—12 (lar.); Dbm., Prod., 100, 35, Pl. 2, f. 81—85; Ste, Ill., vii, 23, 1; Htg., Blattw., 175, 1, t. ii, f. 20; Thoms., Hym. Sc., i, 71, 1; Voll., Tijd. Ent., iii, 202, 205, pl. 9; Ent., No. 139, 26—29; Kalt., Pfl., 222; Brischke, Beschr., 10, t. ii, f. 3 (lar.); Cam., Proc. N. H. S. Glas., iii, 19, 1; Fauna, 28, 1; Br. and Zad., Beob. ü. Blattw. (2), 30, 12, Taf. 1, f. 8.
Cladius Geoffroyi, Lep., Mon., 58, 166.
— *pectinicornis*, Costa, F. N., Tenthr., 2, pl. lxiii, f. 1 (Antenna); André, Species, i, 80; Cat., 9,* 2.

Black, shining, covered with scattered grey pubescence; knees, tibiæ, and tarsi yellowish-white, last two or three joints of tarsi (especially the posterior) fuscous. Cerci long; epistoma slightly convex. Wings faintly smoky, the apex clearer, nervures at base and costa fuscous or pale-reddish, at apex blackish, stigma obscure black, tegulæ grey or white. ♂ smaller and narrower than ♀ and easily distinguished by the antennæ.

Length 4—5 lines.

Beyond slight colour aberrations, I have not noted any varieties of this species in Britain. Hartig describes a small form (named by him *lacteus*) which had the sheaths of the saw and the last abdominal segment milk-white; while the *C. Geoffroyi* is distinguished by having the prolongation of the third antennal joint milk-white. Both aberrations are owing no doubt to the immaturity of the specimens.

The larva lives on the underside of the leaves of various roses, both cultivated and wild, in which it devours irregular holes; occasionally the leaves are eaten along the edges. The midrib is never touched, and the larger nervures rarely, if ever. Two generations are met with in the year, the first in May and the early part of June, the second in August and September. From the summer brood the flies appear two or three weeks after pupation. The autumnal larvæ remain unchanged till the spring. The cocoon is double, the outer covering transparent and thin, and is separated by a small space from the inner cocoon, the texture of which is closer, finer, and more compact. Both coverings are of a dull grey colour.

The larva is flat, moderately narrow at the second segment; thence it increases in thickness to a little past the middle, from where it decreases again slightly towards the tail. The head is small, shining, covered sparsely with longish hairs; the ground colour is green, but obscured with numerous small brown dots, closely packed together; across the face is a semicircular brown mark of a deeper colour than the dots on the vertex; eyes deep black; mouth brown. The body is entirely deep green, sometimes having a yellowish tinge. On each segment are three rows of tubercles, from each of which projects a long brown hair; the legs are glassy green with brown claws. The colour of the head varies; when the larva is young it is browner than when full fed, at which time the whole body assumes a much brighter, more shining green colour. *Acrotomus lucidulus*, Gr., and *Mesochorus cimbicis*, Rtz., are parasites.

The pupa I have not noticed when very young; when I did see one it was of a grey colour.

This species is tolerably common in Scotland and England, especially in gardens.

Continental distribution: General.

SECTION II.

♂ with the antennæ as long as the body, covered with longish pile; third joint at the base produced into a knob; remaining joints simple. Cerci short. *Trichiocampus*.

1 (2) Labrum emarginate at apex. Epistoma keeled; third joint in ♀ scarcely curved. Patellæ large. Abdomen ochreous. *Viminalis.*

2 (1) Apex of labrum rounded. Third joint of antennæ curved, slightly produced beneath. Epistoma not keeled. Abdomen black.

3 (4) Legs yellowish-red. *Rufipes.*

4 (5) Femora entirely black. *Eradiatus.*

5 (4) Femora nearly all white; wings not clearer at apex than at base. *Drewseni.*

2. Cladius viminalis.

Vol. I, Pl. V, fig. 2, Larva; Pl. XV, fig. 3, ♂. Vol. II, Pl. XIV, fig. 1, Saw.

Tenthredo viminalis, Fall., Acta, 1808, 117, 59.
Nematus grandis, Lep., Mon., 61, 179; F. Fr., pl 10, f. 1.
Cladius luteiventris, Dbm., Prod., 103, 3.
— *luteicornis*, Ste., Ill., vii, 24, 7, Pl., 38, f. 1.
— *eucera*, Htg., Blattw., 177, 4.
— *viminalis*, Voll., Tijd. Ent., i, 176, Pl. 10; Zool. (*s.s*)., 7721; Bouché, Naturg., 100; Ratz., Forstins, iii, 129, T. 9; Brischke, Beschr., 9, pl. ii, f. 1; Thoms., Hym. Sc., i, 74, 5; Cam., Proc. N. H. S. Glas., iii, 20, 2; Fauna, 28, 2; Br. and Zad., Beob. ü. Blattw. (2), 26, Taf. 1, f. 5.
Trichiocampus viminalis, André, Species, 1, 81; Cat., 9,* 1.

Luteous; head, middle of breast, pronotum in front above, meso- and metanotum for the greater part shining black. Antennæ longish, black above, ochreous beneath; apex of tarsi brownish or fuscous. Wings yellowish hyaline, slightly clearer at the apex; nervures and costa dark reddish-brown; stigma dark fuscous at base, tegulæ luteous. The first transverse cubital nervure may be absent or present.

The ♂ has the antennæ longer, dark yellow in colour, except the basal two joints which are black.

Length 3—3½ lines.

The larva has the head compressed in front, shining black; mouth pale yellow; mandibles black. Legs white; the thoracic with a line over them. The second, third, and the last two segments orange; the rest of the body green, sometimes with a faint orange tinge. On each side close to the top are twelve large oval or roundish black marks; directly over each clasper is a small black mark; over these and close to the large marks are two small black ones; on the anal segment above is a large oval black mark. When full fed, the body is entirely orange except the legs and the abovementioned black marks. The body is rather flat, broader in front than behind; the skin is beset with tubercles, from each of which proceeds a longish hair; the segments are well marked.

The eggs, according to Van Vollenhoven, are deposited in the leaf-stalk of the poplar, which becomes thereby swollen on both sides and bent over so as to partially cover the eggs. In one case ten eggs were laid on one and eight on the other side of the stalk. When young the larvæ are green, with black heads; it is not till the second moult that the orange colour appears.

The larvæ feed in company on the underside of the leaves of the poplar, in a row of three to five on a leaf, each larva touching its neighbour. They eat only the epidermis, never making holes in the leaf like the other species. There is, I believe, only one brood in the year, namely, during August and September. The cocoon is double, thin and yellow in colour, and in confinement is spun between the leaves; outside I believe it is usually spun between loose bark.

I think the larvæ go down to the earth during the heat of the day; at any rate, I have only found them during the evening feeding on the leaves. When full fed I have found them walking up the trunks of trees apparently in search of a suitable place to pupate.

The pupa is orange.

As parasites Brischke records (Sch. Ges. König., xi). *Mesoleius rufus*, Gr.; *Polyblastus sanguinetorius*, Rtz.; *Acrotomus lucidulus*, Gr.; *Polysphincta areolaris*, Rtz.

Commonly distributed in Britain.

Continental distribution: Sweden, Holland, Germany, France.

3. CLADIUS RUFIPES.

Pl. IX, fig. 4, Larva; Pl. XIV, fig. 5, Saw.

Cladius rufipes, Lep., Mon., 58, 167; F. Fr., pl. 12, f. 5; Dbm., Prod., 102, 36, Pl. 2, f. 86, 87; Ste., Ill., vii, 23, 2; Thoms., Hym. Sc., i, 72, 2; Cam., Proc. N. H. S. Glas., iii, 22, 3.
— *ulmi*, Br. and Zad., Beob. ü. Blattw. (2), 28, 8, Taf. 1, f. 7 (lar.).
— *uncinnata*, Htg., Blattw., 176; Voll., Tijd. Ent., iv, 84—87. pl. 4; Zool., 9833—35; Kalt., Pfl., 539.
Trichiocampus rufipes, André, Species, i, 82; Cat., 19,* 2.

Antennæ about the length of the body, pilose, deep black, the joints distinctly separated; basal two joints large, third and fourth equal in length, the third curved beneath, the remaining decreasing gradually in length and very noticeably in thickness towards the apex. Head very broad, projecting in front between the antennæ, shining, covered with short down; labrum and mandibles piceous, palpi fuscous. Thorax black, sutures distinct, shining, smooth, covered with fuscous pubescence; cenchri large, white. Abdomen short, thick, black, anal segment piceous; cerci short. Legs reddish-yellow, coxæ, trochanters, and anterior femora at base black; apex of tarsi fuscous. Wings smoky, the apical third almost hyaline; tegulæ testaceous, costa and stigma dark fuscous. Near the base of the second cubital cellule is a small horny point.

The ♂ is similarly coloured, but the antennæ are densely pilose, and there is the process on the third joint.

Length 2½—3 lines.

The larva is green, pilose, the sides raggedly indented; head yellow; the eye-spots and one, or more often two, marks on vertex black. When young there is a brown transverse band on the front.

It feeds on tall elms, in the leaves of which it eats holes. The cocoon is transparent and is spun either to a branch or attached to a leaf. There are two broods in a year.

Brischke records *Mesoleius impressus*, Brischke, as a parasite, and *Pteromalus saltans*, Rtz., has also been bred from it.

Common in the Midland and Southern Counties in England; rare or absent in the north.

Continental distribution: Sweden, Germany, Holland, France.

4. CLADIUS ERADIATUS.

Pl. XIV, fig. 3, Saw.

Cladius morio, Lep., Mon., 58, 168?
— *eradiatus*, Htg., Blattw., 176, 2; Thoms., Hym. Sc., i, 72, 3; Kalt., Pfl., 288; Cam., Proc. N. H. S. Glas., iii, 23, 4; Fauna, 28, 3; Br. and Zad., Beob. ü. Blattw. (2), 29, 9.
Trichiocampus eradiatus, André, Species, i, 83; Cat., 10,* 3.

Antennæ moderately long, densely pilose, black, the third joint curved. Head black, covered with fuscous pile; clypeus slightly incised, labrum and palpi piceous. Thorax black, shining, covered with fuscous pile; tegulæ black; abdomen black, pilose, blotch large; cerci short. Wings almost hyaline, stigma fuscous. Legs: coxæ; trochanters, and femora black; knees, tibiæ and tarsi dull white, clearer in front than behind.

Length 2¼ lines.

From *pectinicornis* ♀, *eradiatus* is known by its more attenuate antennæ, uniformly coloured wings, and fuscous-white tibiæ and tarsi; from *Brullæi* the colour of the wings will serve to distinguish it.

The larva has not been described, but the imago was bred from the stem of *Anthriscus sylvestris*, and from the larvæ found there an ichneumon—*Hemiteles trichiocampi*, Boie—was bred. *Cf.* Kaltenbach, *l. c.*

This is not a very common species. Rannoch, and south of England.

Continental distribution: Sweden, Germany, France, Italy.

5. CLADIUS DREWSENI.

Cladius Drewseni, Thoms., Hym. Sc., i, 73, 4; Cam., Proc. N. H. S. Glas., iii, 24, 5; Br. and Zad., Beob. ü. Blattw. (2), 30, 11.
Trichiocampus Drewseni, André, Species, i, 83; Cat., 10,* 4.

Black; antennæ a little longer than the body, very slightly pilose; third joint a very little shorter than fourth, and a little curved beneath, the other joints becoming gradually shorter and thinner. Head covered with grey pubescence, smooth, shining; epistoma somewhat convex; on the front immediately above the antennæ, is a very distinct round depression, and below them are two comparatively large pits;

mandibles and apex of labrum piceous; palpi pale. Thorax shining; pronotum minutely punctured; tegulæ black, cenchri oval, white. Abdomen broadest in the middle, greyish pilose, especially the apex; cerci short. Wings sub-hyaline, costa pale, stigma fuscous. Legs white, femora inclining to yellow, marked with black in the middle, anterior coxæ almost wholly, posterior at base, and posterior tarsi at the apex, fuscous, claws and calcaria short.

The ♂ has long, pilose antennæ, the knob at the base of the third joint small. The femora have more black than in the ♀; anal lobes testaceous.

Length 2¼ lines.

The colour of the legs separates this species from the rest of the section. It is very like the white-legged aberration of *C. padi*, but may be known from it by the epistoma being convex instead of keeled, and by the shorter cerci and calcaria.

Rare; but widely distributed.

Continental distribution: Sweden.

SECTION III.

Antennæ in the ♂ simple, compressed. Cerci longish. Epistoma sub-carinate.

1 (2) Apex of coxæ and trochanters white, femora for the greater part white. *Padi.*
2 (1) Coxæ, trochanters, and femora black. *Brullæi.*

6. CLADIUS PADI.

Vol. I, Pl. V, figs. 4 and 6, Larva; Pl. XV, fig. 4, ♂ Antenna; 5, ♀; Pl. XXI, fig. 9, Saw. Vol. II, Pl. XXVII, fig. 3, Trophi of Larva.

Tenthredo padi, Lin., F. Sv., 1544; Fall., Acta, 1808, 110, 47.
Priophorus albipes, Dbm., Prod., 104, 38, pl. 2, f. 88 and 89.
Cladius pallipes, Lep., Mon., 59, 169; F. Fr., pl. 12, f. 6; Ste., Ill., vii, 23, 3.
— *immunis*, Ste., l. c., 24, 5.
— *pilicornis*, Curt., B. E., pl. 457; Ste., l. c., 24, 6.
— *albipes*, Htg., Blattw., 175, 8, Pl. 2, f. 3, 10, 16, 17, 19, 25, 26, 29; Voll., Tijd. Ent., vi, 72—75, pl. 5; Brischke, Beschr., 10, pl. 2, f. 2; Kalt., Pfl., 174; Br. and Zad., Beob. ü. Blattw. (2), 22, Taf. 1, f. 4.
— *padi*, Thoms., Hym. Sc., i, 75, 5; Cam., Proc. N. H. S. Glas., iii, 25, 6; Fauna, 29, 5.
Priophorus padi, André, Species, i, 84, 1; Cat., 10,* 1.

Black; antennæ setaceous, nearly as long as the body. Head covered with fuscous down, frontal sutures very distinct, epistoma keeled; mandibles piceous, palpi pale testaceous. Thorax shining, covered with scattered greyish down; cenchri large, dull white; tegulæ piceous, more rarely pale. Abdomen covered with scattered pubescence; cerci longish. Wings sub-hyaline, with a smoky tinge (varying in different individuals), costa pale, stigma fuscous. Legs white, base of coxæ, femora in the middle, and often the posterior tarsi with the apex of tibiæ black. Calcaria longish.

The ♂ has the antennæ strongly compressed, pilose, and a little shorter than the body.

Length 2—2½ lines.

C. padi is to be recognised by always having the trochanters and base of coxæ white, by the keeled epistoma, longish cerci and calcaria, and pilose antennæ. In the coloration of the legs four aberrations occur.

a. Femora entirely white.

b. Femora with a fuscous splash in the middle.

c. Femora nearly all black.

d. Posterior tarsi and apex of tibiæ black.

Also in many specimens the colour is testaceous, and may have a yellowish tinge. The wings vary in the amount of smoky tinge with which they are suffused, and the tegulæ vary from black through testaceous to white.

Larva: head covered with longish hairs; light orange brown, spotted over with small orange dots; eye-spots black, a black roundish mark on vertex extending to the extreme back of the head; mouth reddish-brown with black mandibles. Legs white, claws brown. The ground colour of the body is usually green, varying to grey; the sides are clearer, almost white, and the last two segments are also white. The skin is beset all over with tubercles, each ending in a long hair.

When young the larva has the colour not so deep, and the body has often a reddish tinge, especially when the food-canal is filled. In old larvæ the colour of the head varies very much; sometimes it is quite orange, at other times almost black, and often the black mark on the vertex is absent.

The eggs are laid about the beginning of May, on the under surface of the leaves of the hawthorn, wild rose, bramble, mountain ash, pear, plum, and birch. When very young the larvæ merely eat the epidermis, but as they get older large holes are eaten all over the leaf, and frequently considerable damage is done in this way to pear and plum trees. From the spring eggs the imagos come forth in about five weeks after the eggs were laid, the pupal state lasting from nine to ten days; the second brood occurs in the autumn often as late as October. I believe there are only two broods in Britain, but on the Continent four broods in the year have been recorded. When not feeding the larvæ remain rolled up in a ball on the under side of the leaf, and if touched they drop at once to the earth.

The pupa is greyish-white. The cocoon is of the normal form.

I have reared *Tryphon lucidulus* and *Ichneutes reunitor*, Nees, from the larvæ.

A common and generally distributed species. The aberration with the legs entirely white is very rare in Scotland. In mountainous districts in Scotland I have taken *padi* at an elevation of 2300 feet. It is generally distributed through Europe.

7. CLADIUS BRULLÆI.

Vol. I, Pl. V, fig. 1, Larva. Vol. II, Pl. XIV, fig. 2, Saw.

Cladius Brullæi, Dbm., Consp., 39; Thoms., Hym. Sc., i, 75, 7; Cam., E. M. M., xii, 42; Proc. N. H. S. Glas., iii, 26, 7; Fauna, 29, 6; Br. and Zad., Beob. ü. Blattw. (2), 23, 2.
Priophorus geniculatus, Dbm., Consp., 38.
Cladius tristis, Zad., Beschr., 11.
Priophorus Brullæi, André, Species, i, 85; Cat., 10,* 2.

Black; antennæ a little longer than the abdomen, slightly compressed, diminishing very noticeably in thickness towards the apex, scarcely pilose, the third joint a little longer than the fourth. Head shining, clothed with fuscous pile, epistoma compressed, the pits below the antennæ shallow; apex of labrum hairy, mandibles black. Thorax black, shining, covered with fuscous pile; sutures of mesonotum deep; breast smooth, shining, with the pubescence less dense, more scattered; cenchri pale, large; tegulæ piceous. Abdomen a little shorter than the head and thorax, apex angustate, densely pilose, saw projecting, sheaths hairy; cerci short. Wings with the basal half smoky, the apex hyaline, costa and stigma dark fuscous. Legs: coxæ, trochanters, and femora black; knees, tibiæ and tarsi white; posterior tarsi a little darker; apex of tibiæ fuscous; posterior tarsi shorter than tibiæ, calcaria short.

The ♂ has the antennæ short, slightly pilose.

Length 2 lines.

The black coxæ, trochanters and femora, less pilose antennæ and shorter cerci and calcaria will readily enable this species to be separated from *padi*. The ♀ may be known from the same sex in *eradiatus* by the wings being smoky at the base with the apical half hyaline.

Larva: head deep shining black, legs white, upper half of body deep brownish, rather glistening, black, lower half glistening white. The base of the second and the anal segment white, the head hairy, body covered with tubercles, from each of which issues a long hair.

It feeds on *Rubus idæus* and *R. fructicosus*, and in its habits and mode of pupation agrees with the other species.

Rare. Clydesdale, Worcester.

Continental distribution: Sweden, Silesia, Italy.

Genus—CRŒSUS.

Crœsus, Leach, Z. M., iii, 129; Htg., Blattw., 124; Norton, Trans. Amer. Ent. Soc., i, 83.
Nematus, Thoms., pt. Hym. Sc., i, 84.

Wings with one radial and four cubital cellules, second cubital more than double the length of the third, which is nearly as broad as long; the second cubital receiving both recurrent nervures. Transverse basal nervure received a little past the transverse costal; transverse median before the middle. Lanceolate cellule petiolate. Antennæ long, setaceous; third joint a little shorter than the fourth. Posterior legs long, apex of tibiæ dilated, flattened and hollowed on inner side. Metatarsus much longer than all the other joints together, dilated on upper side (which is curved), flattened and hollowed; second joint as long as two succeeding; claws bifid; calcaria curved.

The vertex is thick, clypeus incised, mandibles with a long apical tooth, and no subapical. The inner lobe of the maxilla is acutely pointed, and does not reach the top of the outer; the three basal joints are thicker than the others, the second is nearly double the length of first, the third is the longest, fourth a little shorter than fifth, which is also a little longer than the sixth; the two middle joints of the labial palpi are the longest, the fourth is a very little longer than the first.

In coloration the species are very similar, the head and thorax being black, the abdomen black, broadly banded with red; the legs black, red, and white.

The larvæ have cylindrical bodies, and are provided on the ventral surface with large glands which they can protrude at will, and from which a nauseous odour is given out. They feed along the edge of the leaf and expose the glands by turning the abdomen over the head.

The peculiar structure of the posterior legs distinguish *Crœsus* from *Nematus* proper, from which it does not differ otherwise. The ventral glands of the larvæ are much more developed than in any species of *Nematus*. There are four European species, and two are known from North America. The genus would seem to be northern in its distribution.

Synopsis of Species.

1 (4) Fore wings more or less clouded; ♀ femora beneath or above black.

2 (3) Fore wings distinctly clouded from stigma to apex; femora black beneath; ♂ antennæ black, apex of abdomen black. *Septentrionalis.*

3 (2) Fore wings with only a faint cloud below the stigma, posterior femora reddish beneath; ♂ antennæ brown beneath at the apex; apex of abdomen entirely brownish-red. *Latipes.*

4 (1) Fore wings unclouded; femora reddish above and beneath, black at apex; ♂ unknown. *Varus.*

1. CRŒSUS SEPTENTRIONALIS.

Vol. I, Pl. IV, fig. 5, Larva; Pl. XIV, fig. 6 ♀; *a*, Ant.; *b*, Saw; *b*, *c*, *e*, Trophi; *f*, Head; *g*, Claw; *h*, Tarsus. Vol. II, Pl. XXVII, fig. 5, Maxilla of Larva.

Tenthredo septentrionalis, Linné, S. N., 557, 24; F. Sv., 926, 36; Müller, Z. Dan., 1730; Schrank, Enum., 672; Panz., F. G., 64, f. 11; Fabr., S. P., 42; De Geer, Mém., ii, 262, pl. 37, f. 24, 28 (lar.); Fallén, Acta, 1804, 60; Zetterstedt, I. L., 349, 41.
— *largipes*, Retz., De Geer, 73, 309.
Nematus septentrionalis, Olivier, Enc. Méthod., 166, 4; Lep., Mon., 65, 184; F. Fr., 64, 6; de Villaret, Ann. Soc. Fr., i, 303; Hartig, Blattw., 184, 2; Vollenhoven, Tijd. Ent., ii, 74—78, pl. 5 (ec.); l. c., 2nd series, v, 75; Vollenhoven, Zool. (s.s.), 8175; Thomson, Opusc., 614, 1; Hymen. Scand., i, 84, 5; Ratzeburg, Forst-Ins., iii, 118, pl. iii, f. 3 (ec.); Brischke and Zaddach, Schr. Ges. König., xvi, 54, 5, pl. i, f. 2; Eversmann, Bull. Mosc., xx, 14, 1; André, Species, i, 100; Cat., 12*, 1.
Nematus laticrux, Villaret, l. c., 307, pl. 11, f. 7; Hartig, l. c., 186, 5; Eversmann, l. c., 14, 2.
Crœsus septentrionalis, Leach, Z. M., 129; Curtis, B. E., i, pl. 17; Stephens, Ill., vii, 38; Doubleday, Ent. Mag., i, 313, pl. 1, f. 5; Smith, Ent. Ann., 1866, 135, 137; Inchbald, E. M. M., v, 21; Costa, F. Nap., 12, pl. 63, 4; Kaltenbach, Pfl., 606.
— *laticrux*, Stephens, l. c., 39.

Black; shining, punctured, and covered with short, although dense, pubescence. Antennæ as long as the body, bare, third joint a little longer than the fourth, the remaining joints a very little shorter; each decreasing considerably in width towards the apex. Head punctured, half shining; the antennal tubercles large, foveæ large, distinct; apex of clypeus notched; apex of mandibles piceous; the palpi are white, darker at the base. Thorax black, slightly shining, densely punctured; pleuræ opaque, impressed with rugose punctures, pubescent; the breast smooth and shining; tegulæ black. Wings hyaline, a little clouded from the commencement of the first cubital cellule, clearest at the extreme apex; the apex of posterior wings also clouded: in the centre of the second cubital cellule is a black horny point. Legs black, coxæ, trochanters, and base of posterior femora, anterior tibiæ and

tarsi (except at the apex which is black) and a little more than the half of the two posterior tibiæ, white; apex of anterior femora brown beneath, anterior tibiæ and tarsi at the apex with a dilute reddish tinge; base of intermediate tarsi reddish; the posterior calcaria are of the same colour. The abdomen has the basal two and the apical two or three segments black, the rest reddish-brown. The cerci are moderately long, black.

The ♂ has the femora red, the apex of posterior black above; the mouth and tegulæ are reddish.

Length 5½—6 lines.

Easily recognised by the clouded apex of the wings and the black femora.

Larva: the head is black, shining, the mouth greyish. The body is greenish or bluish-green, the second and anal segments orange-yellow. A little above the spiracles is an irregular black spot, below them are three black spots, one large, two small; over the legs are three or four square black spots, with some black lines. On the second segment below the spiracle is a narrow irregular black mark. On the top of the anal segment is a large triangular black spot, ending in the black cerci. The legs are greyish, with brown claws, and sometimes there is a little brown on the tarsi; the claspers are yellowish. On the belly, between each pair of legs, is a triangular black spot, and before these, in the direction of the head, is a small black line. There is a large yellowish gland on the fifth, seventh, eighth and ninth, and a smaller one on the fourth and tenth.

When young it is whitish-green with a brown head. At the second moult it is pale green, with the anal segment a little yellowish, and there are two black stripes on the sides.

The eggs are laid in the veins of the leaf. The larvæ feed (from four to eight on a single leaf) in a row on the edge of a leaf, holding on with the fore-legs, the rest of the body is flung out in a curve into the air, the anus turned down or up, and often nearly touching the head. When anything approaches, the body is thrown violently about, and the ventral glands are actively protruded. They feed quite exposed, and frequent poplar, aspen, birch, willows, hazel, and mountain ash. Frequently they are very injurious.

The larvæ are found commonly from July to the end of September, and they spin in the earth a longish brown single cocoon. In the south of England there are, I believe, two generations in a year, but in Scotland I have only evidence of there being one, although I have caught a ♂ in the middle of August, the usual time for the imagos to appear being May and June. Stephens says that the larva feeds on the gooseberry, but this is doubtful.

As parasites there have been recorded *Tryphon gibbus*, Ratz.; *Mesoleius melancholicus*, Gr.; *M. septentrionalis*, Ratz.; *M. sexlituratus*, Grav.; *Polysphinctus areolaris*, Ratz.; *Mesoleptus testaceus*, Gr.; *Limneria argentata*, Gr.; *Limneria chrysostictus*, Rtz.; *Pimpla angens*, Gr.; *Ichneutes reunitor*, Nees; and *Microgaster alvearius*, Spin.

Very common and generally distributed.

Continental distribution: Lapland, Finland, Scandinavia, Denmark, Livland, Curland, Ural Range, Germany, France, Italy.

2. Crœsus latipes.

Nematus latipes, Villaret, Ann. Soc. Fr., i, 306, pl. 11, f. 4—6 (1832); Hartig, Blattw., 185, 3; Voll., Tijd. Ent. (2), ii, 174—177, pl. 8 (lar., coc., pupa, and both sexes); Ent., v, 252—255; Kaltenbach, Pfl., 607; Cameron, Proc. Nat. Hist. Glas., ii, 301; Brischke and Zaddach, Schrif. Ges. König., xvi, 56, pl. 1, f. 3 (lar.); André, Species, i, 101; pl. xiii, f. 8 (lar.), Cat., 12,* 3.

Black, shining, slightly pubescent; mesopleura opaque; mouth black; palpi pale. Abdomen red, black at the base; the seventh, at the sides, and eighth, with the cerci of the same colour. Legs: the anterior femora black, the apex light reddish, intermediate black; the knees reddish, the posterior black above, bright red on the under surface; anterior tibiæ white; middle pair with the basal half white; apical half black above, red beneath; posterior white at the base, and the apical half black; the four anterior tarsi dull grey, darker at the point; the posterior pair black. Wings hyaline, with a small faint cloud a little below the brownish stigma.

The ♂ has the antennæ faintly brownish beneath at the point; and the apex of the abdomen entirely brownish red; the legs are more obscurely coloured than in the ♀; the posterior tibiæ have a reddish tinge in the centre.

Length 3¼—3¾ lines.

C. latipes is distinguished from the preceding species by the smaller size of the cloud in anterior wings, which in *septentrionalis* occupies the apical fourth of both wings; the posterior femora are generally reddish beneath, but this is a character which is subject to some variation. The amount of red on the abdomen also varies, the last two, three, or four segments being black in various specimens. The ♂ is readily known from that of *septentrionalis* by having part of the sixth and the seventh and eighth entirely black; the eighth only being black in the other species.

C. Brischkii (from Prussia) is very like *latipes*, but has the pleuræ less deeply punctured, and the tibiæ of the four anterior legs are entirely dirty white, while in *latipes* they are brownish with the anterior and blackish with the middle pair. *Brischkii* feeds on *Carpinus betulus.*

The larva is deep black, the skin in folds and covered with short pubescence. The space surrounding the spiracles, the second segment in front, the four anterior segments, the twelfth on the belly, and the legs, are shining yellow; the mouth is pale yellow and the claws are brown, there being also a brownish mark about them. When very young they are pale brown. Length about 13 lines.

In their habits the larvæ do not differ essentially from those of *septentrionalis*, but they seem to confine themselves entirely to birch. There is only, so far as is known, one brood, which extends from July to September, the imago appearing in May and June. They pupate in the earth. As parasite they have *Perilissus filicornis*, Gr.

C. latipes does not appear to be common. I only know of it from Clober Wood, near Glasgow, Hanley, and Worcester (J. E. Fletcher).

On the Continent it is found in Prussia, Holland, France, and at Riga. Possibly it is this species which Eversmann (Bull. Mosc., xx, 14) describes from Orenburg as *N. laticrux.*

3. Crœsus varus.

Vol. I, Pl. IV, fig. 4, Larva.

Tenthredo septentrionalis, Fallén, Acta, 1808, 60, 21, var. a; Zetterstedt I. L., 349, 41.

Nematus varus, Villaret, Ann. Soc. Ent. Fr., i, 306, pl. xi, f. 8; Stephens, Ill., vii, 39; Hartig, Blattw., 186, 4; Thomson, Opus., 615, 2; Hymen. Sc., i, 86, 6; André, Species, i, 100, pl. xiii, f. 2 (lar.); Cat., 12,* 2; Vollenhoven, Tijd. Ent., vi, 76—80, pl. 6 (lar. imago, and coc.); Br. and Zad., Schr. Ges. König., xvi, 58, pl. 4, f. 4 (lar); Kaltenbach, Pfl., 619; Cameron, Proc. Nat. Hist. Soc. Glas., ii, 301. The larva was also described by De Geer, Mém., ii, 264.

Black, shining, covered with fuscous pubescence; mesonotum slightly punctured, pleuræ opaque, faintly pubescent; the clypeus in part, labrum and palpi white; the pronotum at the base is testaceous, and the four or five middle abdominal segments are reddish. Legs: femora red, the posterior black at the apex; the four anterior tibiæ white, the posterior with the basal half of the same colour, the apical half being black; the spurs pale reddish; four anterior tarsi white, the posterior black; trochanters white. The wings are hyaline, the tegulæ testaceous.

Length 3½ lines.

Readily distinguished by the hyaline, unclouded wings, white mouth, and reddish femora.

With the exception of Villaret, no one seems to have found the ♂, which is undoubtedly very rare. Villaret describes it as not differing from the other sex.

The larva has the head rather small, and covered with microscopic hairs; the colour is pale greyish green. On the face is a brownish spot, and above this splash is a small black dot; the vertex is dotted with minute fuscous points; eye-spots black. The legs are rather long, green, with brown claws, a somewhat triangular mark is over each; the abdominal legs are glassy green. The body is long and cylindrical, tapering towards the end; the colour is bright green; the last segment is a little paler and bears a black mark on the top. On the middle of the sides is a row of black dots, placed rather wide apart and ending on the twelfth segment. Below this row is another line of smaller black dots, and directly over each of the legs are two or three little black marks. Near the head the superior row is placed higher up. Length about 12—13 lines.

When young the larva has the ground colour pale brown.

It feeds on alder, and is less gregarious than that of the other species of the group. Usually only one or two feed on a single leaf; neither do they appear to be so active as the more conspicuous larvæ of *septentrionalis* and *latipes*. They are found from July to September, and are double brooded. The imagos first appear in June.

Not uncommon in Britain. In Scotland I have found it in Clydesdale, Glenelg, Kingussie, Braemar, Rannoch.

From England I have seen specimens from Worcester (Fletcher), Devonshire (Parfitt), and Glanville's Wootton.

It is widely distributed in Europe; Lapland, Sweden, Finland, Riga, Prussia, Silesia, Harz Mountains, Holland, and France.

Kirby (List of Hym., i, 103) records it from Nova Scotia.

Genus—NEMATUS.

Nematus, Pz., F. G., Heft xc, pl. x (1805); Jurine, Hym., 59.
Messa, Leach, Z. M., iii, 126.

Antennæ nine-jointed, the third joint equal to the fourth or shorter than it, seldom longer than it. Wings with one radial and three or four cubital cellules; if four the second receives both recurrent nervures, if three the first receives them. Lanceolate cellule petiolated. Posterior wings with two middle cellules.

The antennæ are usually shorter than the body, and may be filiform or setaceous and sometimes compressed, with the joints produced at the apices. The pentagonal area and the sutures on the vertex are usually distinct enough. The clypeus may be deeply incised, slightly curved, or completely transverse. The eyes do not reach to the base of the mandibles; these are of moderate size, broad at base, blunt at the apex, and have no distinct subapical tooth. The palpi are longish, thicker at base than at apex, and with the joints of varying length.

The abdomen is short and broad, or long and cylindrical. The last segment may be scarcely developed above or may be developed largely; beneath it may be very short or may occupy the greater part of the ventral surface; in the latter case the cerci are long. The blotch is seldom very large.

The legs are of moderate length; the calcaria are not much more than one-third of the length of the metatarsus and may be shorter; the claws simple, bifid, or with a subapical tooth.

The third cubital cellule is much longer than the second; the transverse median nervure is received near the middle of the cellule and does not vary much in position. In some species the second recurrent nervure is interstitial; the transverse median nervure in the hind wings may be joined to the recurrent or placed at a greater or less distance from it. The accessory nervure is appendiculated more or less beyond the middle. In one or two sections (*appendiculatus*, *Erichsonii*) the first transverse cubital nervure is completely absent. In other species it is often very faint or entirely obliterated in the middle.

The body is usually smooth, shining, impunctate; in only a few species is the thorax and head punctured; the body is seldom pilose to any extent.

The larvæ have twenty or only eighteen legs; when the latter is the number it is the penultimate pair which are wanting. They have mostly cylindrical bodies, but a few which feed on the surface of the leaf are flattish. Many (especially those with gaudily coloured bodies) have glands between the ventral legs from which a fetid odour can be emitted. In habits they vary much; some are gregarious, others solitary; most feed exposed, while a few live in rolled-down or folded-down leaves, and some of the smaller species raise galls on leaves. The pupa is green, but may also be more or less orange.

The cocoon is single or double. The eggs are laid singly or in masses on the surface of the leaf, along the midribs or in the twigs; they may be merely glued to the leaf, or more generally they are sunk in the leaf or twigs as the case may be.

This is one of the largest, and also one of the most difficult genera of the Tenthredinidæ. The species differ but little in structural details, there is very little variation in sculpture, the vast majority of the species being smooth and shining, seldom or never punctured; there is equally little variety in pubescence. In coloration there is not much variety either; the species fall in this respect into five groups:—(1) Species with entirely black bodies, and with either entirely or more or less reddish legs, or with white or white and black legs; (2) black species with the abdomen banded with red; (3) the black and yellow species, (4) the wholly yellow species, or yellow marked with black, (5) the green species.

These, however, become mixed the one with the other, owing to some species combining to a more or less extent the characters of two or even three of the groups; hence the arrangement and classification of the species is a work of very great difficulty.

The first author who separated and arranged the species into groups distinguished by coloration or structural peculiarities, or by both, was C. G. Thomson (Hymen. Scand., i), and his work is certainly a vast improvement on anything that existed before. Zaddach (Schr. Ges. König., xiv) followed him in this, and in some respects arranged the species into more natural groups, for Thomson, relying too much on certain minute structures or on sculpture, separated widely, it seems to me, species which agree very closely in general coloration and habits.

I have followed Zaddach generally in the grouping of the species. Some of the groups might (and no doubt will hereafter) be united, for with not a few of the species it is difficult to say into what group they should fall, and the differences between some of the sections are by no means great. I believe, however, that after a little study the student will have no great difficulty in finding out, with the definitions I have given, the section to which a given species belongs; and I have noted the points in which the groups vary from, and agree with, their nearest allies.

In specific discrimination the points of greatest importance to be noted are the length, thickness, clothing and colour of the antennæ, the form of the head, of its clypeus and sutures, the sculpture and clothing of the thorax, the form of the abdomen and especially of the last segments. The neuration of the wings is of great importance, especially the relative size of the cubital cellules and the position of the transverse cubital and recurrent nervures. Still, too much reliance must not be placed on the position of the nervures, for they are not constant in any of the species, and in some species vary not a little in both wings. In the legs the length of the calcaria, of the tarsal joints, and the form of the claws, are often of great value in separating species. I have, however, found variations in all these points, and it need scarcely be said that the coloration is not always constant, some species varying exceedingly in this respect.

That the saws afford more or less good specific characters there can, I think, be no doubt. I have had figured as many of them as I could obtain, they being now delineated for the first time. Whether their forms can always be depended upon I cannot say, but I believe they vary within very narrow limits.

The larvæ and habits can most assuredly be depended upon as tests of specific distinction. Indeed, some species can scarcely, if at all, be distinguished in the perfect state, while they are very distinct as larvæ.

The males are much more difficult to distinguish than the females; they are all very similar in coloration, even when the females are very dissimilar.

In the synoptical tables I have omitted the males entirely, not being able to find sufficiently reliable characters that could be used in synoptical form, and, moreover, I am not practically acquainted with the males of half the British species. In the tables I have had to omit some of the species, as I found it impossible to find differential characters that could be of any use.

The species are not known beyond the Palæarctic and Nearctic regions.* Kirby (List of Hymen., i, 1882) enumerates in all 366 species, whereof 281 are from Europe. No doubt a considerable number of these will ultimately be proved to be varieties or synonyms, but as new species are always being discovered, I should not be astonished at there being 400 European species.

They are most abundant in the northern and northwest districts of the Continent. They extend into

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* Except a single species from the North of Mexico at its junction with Arizona.

Iceland, Spitzbergen, and Arctic North America, are found on our highest mountain tops, but are very rare in the South of Europe.

Synopsis of Species.

1 (4) Abdomen black, banded with red in the middle.
2 (3) Pronotum and legs red. *Lucidus.*
3 (2) Pronotum not red, legs black and white. *Quercus* group.
4 (11) Abdomen black, white at the apex above.
5 (6) Legs reddish, pronotum broadly-white above; antennæ long, thin. *Placidus.*
6 (5) Legs black and white, pronotum entirely black or but narrowly edged with white.
7 (8) Clypeus incised, stigma white, antennæ black. *Thomsoni, apicalis.*
8 (7) Clypeus truncated, stigma testaceous.
9 (10) Mesonotum smooth, shining, impunctate; antennæ shorter than body, brownish beneath. *Scoticus.*
10 (9) Mesonotum punctured, opaque or semi-opaque, antennæ black. *Mollis* group.
11 (4) Abdomen entirely black.
12 (15) Legs reddish.
13 (14) Length at least 5 lines, stigma black, pronotum entirely black. *Crassus* group.
14 (13) Length not more than 2 lines, stigma and wings yellowish, pronotum lined with white. *Rumicis, arcticus.*
15 (22) Legs testaceous.
16 (19) Pronotum entirely black.
17 (18) Stigma fuscous, antennæ compressed. *Compressicornis.*
18 (17) Stigma testaceous, antennæ long and filiform. *Fulvipes.*
19 (16) Pronotum lined with white.
20 (21) Stigma fuscous, white at base. *Cinereæ, gallicola.*
21 (20) Stigma white entirely, or bordered with fuscous beneath. *Vacciniellus, leucostigmus.*
22 (23) Legs testaceous and white, stigma testaceous, pronotum lined with white. *Appendiculatus, oblongus.*
23 (24) Legs white, stigma pallid fuscous, length 1½ lines. *Albicarpus, baccarum.*
24 (23) Legs with the femora more or less black.
25 (37) Pronotum entirely black.
26 (27) Tibiæ black. *Abbreviatus.*
27 (26) Tibiæ white.
28 (31) Antennæ brownish beneath.
29 (30) Stigma fuscous, wings fuscous in the middle. *Ruficornis.*
30 (29) Stigma black, wings hyaline. *Fletcheri, nigricollis.*
31 (28) Antennæ quite black.
32 (33) Tegulæ black, length 2½ lines. *Puncticeps.*
33 (32) Tegulæ white.
34 (35) Stigma fuscous. *Funerulus, hibernicus, crassispina.*
35 (36) Stigma fuscous, white at the base. *Bridgmani.*
36 (35) Stigma white or yellowish white. *Herbaceæ.*
37 (25) Pronotum lined with white.

38 (39) Stigma white, eyes broadly surrounded with brown. *Vacciniellus, alienatus.*

39 (40) Stigma fuscous, white at the base, femora black, except at apex and extreme base. *Nigrolineatus.*

40 (39) Stigma yellowish-white, fuscous at apex, femora testaceous, lined towards the middle with black. *Ischnocerus.*

41 (52) Abdomen green or lacteous at the sides, and beneath, stigma white or green.

42 (51) Mesonotum entirely black.

43 (48) Mesopleura black.

44 (45) Femora more or less black. *Obductus, conductus.*

45 (44) Femora entirely green or white.

46 (47) Stigma, clypeus, and metapleura white. *Pulchellus.*

47 (46) Stigma livid, clypeus and metapleura black. *Leucogaster.*

48 (43) Mesopleura greenish.

49 (50) Sternum black. *Maculiger.*

50 (49) Sternum not black. *Orbitalis, lacteus.*

51 (42) Mesonotum with three or more black marks. *Humeralis, fallax, capreæ* group.

52 (53) Abdomen greenish, marked with black at base, or more or less in centre of back, stigma white or green. Mesonotum with three or more black marks, pleuræ and sternum green. *Miliaris* group (except *lacteus, maculiger,* and *orbitalis*).

53 (56) Abdomen testaceous at the sides and beneath.

54 (55) Mesonotum entirely black. *Consobrinus, strongylogaster.*

55 (54) Mesonotum with three or more black marks. *Turgidus, capreæ.*

56 (63) Abdomen yellow, a black band down the centre.

57 (60) Stigma yellow or testaceous, legs yellow.

58 (59) Length 2½ lines, antennæ short, thick. *Pineti, vesicator.*

59 (58) Length over 3½ lines, antennæ long. *Myosotidis, miniatus.*

60 (57) Stigma black.

61 (62) Clypeus truncated, the band narrow, pleuræ partly yellow. *Conjugatus.*

62 (61) Clypeus incised, the band not very narrow, pleuræ entirely black. *Pallidiventris.*

63 (56) Abdomen entirely yellow or reddish, except at extreme base.

64 (75) Meso- and metanotum entirely black.

65 (66) Clypeus truncated, stigma black, legs yellow. *Betulæ* group.

66 (65) Clypeus incised.

67 (70) Stigma black.

68 (69) Pleuræ entirely black, legs with the tibiæ white, the knees black. *Pallidiventris* var.

69 (68) Pleuræ yellow. *Salicis, melanocephalus.*

70 (67) Stigma yellowish or testaceous.

71 (72) Scutellum punctured. *Albipennis, xanthogaster.*

72 (71) Scutellum impunctate.

73 (74) Wings deep fuscous, stigma black at base, ovipositor long. *Abdominalis.*

74 (73) Wings hyaline, stigma not black at the base, ovipositor short. *Monticola, pavidus, myosotidis* var., *togatus, vesicator.*

75 (83) Mesonotum with two or more black marks.

76 (77) Stigma black at the base, ovipositor long. *Caledonicus, bilineatus.*

77 (80) Stigma entirely yellow or testaceous.

78 (79) Yellow, apex and base of abdomen not black. *Croceus, cadderensis, glottianus.*
79 (80) Reddish, apex and base of abdomen black. *Rufescens, glenelgensis.*
80 (84) Stigma black or fuscous.
81 (82) Antennæ entirely black. *Collinus.*
82 (81) Antennæ fuscous beneath. *Ribesii.*
83 (75) Meso- and metanotum entirely yellow.
84 (85) Stigma black at the base, ovipositor long. *Luteus, acuminatus.*
85 (84) Stigma yellow, ovipositor short. *Croceus, flavescens, dorsatus.*

I. THE GROUP OF ERICHSONI.

Black, with abdomen banded with red, or fulvous with black above. Legs variegated; the femora reddish or fulvus, black at the apex; posterior tibiæ pale for the greater part, grooved. Antennæ with the third and fourth joints about equal. Clypeus truncated, front wide, antennal fovea large, but not very deep. Wings with first transverse cubital nervure absent, the third cubital cellule longer than broad. Stigma blackish. Claws with a minute subapical tooth.

A group of small extent, principally distinguished from the next by the red-banded abdomen. The larvæ of the two species are utterly dissimilar.

1 (2) Breast opaque; antennæ brown underneath, short. *Erichsoni.*
2 (1) Breast smooth, shining; antennæ quite black, long. *Quercûs.*

1. NEMATUS ERICHSONI.

Plate XV, fig. 1, Saw.

Nematus Erichsoni, Hart., Blattw., 187, 9; Saxesen, Isis, 1838, 803; Tischbein, Allgem. Forst. u. Jagd., 1840, 37; Ratz., Forst-Ins., 121, pl. 3, f. 4 (egg, lar., im.); Thoms., Opus., 620, 14; Hym. Scand., i. 96, 19; Kalt., Pfl., 700; Br. and Zad., Schrif. Ges. König., xvi, 60, pl. 4, f. 8 (lar.); André, Species, 102, 10, pl. xiii, f. 15; Cat., 13,* 6.

Nematus Leachii, Dbm., Clavis, 27, 36 (lar.).
Pristiphora cincta, Newman, Ent. Mag., iv, 259 (1837) ?

Antennæ a little longer than abdomen, thickish, very slightly tapering towards the apex, black, pale brown beneath, the third and fourth joints equal. Head narrower than the thorax, covered with scattered pubescence, slightly punctured, black; labrum dull testaceous, tips of mandibles piceous; vertex somewhat projecting; sutures indistinct. Thorax black, pronotum edged with fulvous at the base; mesonotum finely punctured, smooth, shining; pleuræ opaque and closely punctured. Abdomen longer than head and thorax, the basal and the seventh and ninth segments black, the others red; cerci short, black. Legs reddish, the tibiæ for the greater part white, anterior tarsi pale; extreme apex of posterior femora above, apices of tibiæ and posterior tarsi black. Wings hyaline, with a faint cloud below the stigma; the second recurrent nervure received considerably in front of second transverse cubital; first transverse cubital absent; second cubital cellule with a horny point; the costa and stigma fuscous, the latter being the darker; tegulæ reddish.

The ♂ is unknown.

Length nearly 6 lines.

The larva feeds on the larch, and in Germany is said to be injurious to that tree. It is shining dark grey; the back (except the second segment) is of a darker grey; the skin is beset with short, blackish tubercles, the spiracles small and brown; legs spotted with black; the head shining black. *Perilissus filicornis* and *Pteromalus Klugii*, Rtz., are its parasites.

Erichsoni does not appear to be a common species. I have only seen a specimen taken by the Rev. T. A. Marshall, of which I do not know the locality. Mr. Dale records it from Glanville's Wootton.

Continental distribution: Sweden, Denmark, Prussia, Holstein, Harz, Bohemia, Holland, France.

Hagen (Canad. Ent., viii, 37) records it from the United States.

Obs. Kirby (List of Hym., i, 103) adopts the name of *Cinctus*, Newman, for this species: but I have not followed him in this because Newman's description fits *quercûs* quite as well as it does *Erichsoni*. Both were described in the same year.

2. NEMATUS QUERCÛS.

Plate I, fig. 2, ♀; 2 *a—c*, Trophi; Plate XV, fig. 2, Saw.

Nematus quercûs, Hart., Blattw., 190, 10; Thoms., Opus., 620, 13; Hym. Scand., i, 95, 18; Br. and Zad., Schr. Ges. König., xvi, 61, pl. 6, f. 17; André, Species, 103; Cat., 12,* 5.
Tenthredo borealis, Zett., Ins. Lap., 353, 53.

Antennæ a little shorter than the body, black, filiform, tapering towards the apex. Head black, shining, covered with greyish pubescence, finely punctured; the clypeus a little rounded at the apex; the labrum white, palpi pale. Thorax black, shining, finely punctured, covered with short microscopic down; pleuræ smooth and shining; the extreme edge of pronotum and the tegulæ pale red. Abdomen clear red; the basal segment, part of second and the apical three, black; cerci longish, black, sheath of the saw black, hairy, projecting. Wings very slightly clouded at apex, clear at base; the costa fuscous, stigma black. Legs: coxæ at apex and trochanters white; the femora reddish testaceous, sometimes with a black line at the base; a black dot on the apex of intermediate, and a large black line on the apex of posterior; tibiæ pale testaceous, apical half of posterior and the posterior tarsi black; the four anterior tarsi are pale testaceous; spurs testaceous, longish, extending to near the middle of the metatarsus.

The ♂ is extremely rare, and I have never seen it. According to Zaddach it is not unlike the ♀ in coloration, but the reddish band on the abdomen is narrower, and is interrupted in the middle with black spots. Sometimes the ring is present only on the third and fourth segments; in other specimens it extends from the second to the fifth, and in this case the second, third, and fifth segments bear, in the middle, a broad black splash, and the fourth two small black spots. The belly is nearly all yellow.

Length 3 lines.

The wings are sometimes hyaline; the coxæ are often black at the base; sometimes the posterior trochanters and the femora are nearly all black. In one of my Scotch specimens the posterior tibiæ are totally black. The amount of the red colour on the abdomen also varies. The first transverse cubital nervure is rarely present.

From *Erichsoni* the present species is easily known by its smaller size, thinner, longer, and quite black antennæ, whitish labrum, and smooth shining pleuræ; the posterior legs are also darker coloured.

The larva, according to Brischke, feeds on *Vac-*

cinium myrtillus during June and July (I have found them in August), living solitary and are very lazy. The body is spindle shaped; the head is broad above, and if viewed from the front, appears almost triangular. The ground colour is a beautiful brick red, with a dark brown dorsal stripe. On the fifth and following segments are, on each side, oblique stripes of the same colour, proceeding towards the posterior; and on the same parts the dorsal stripe appears on both sides enclosed by clear, almost white lines. Out from these each segment bears (with the exception of the three posterior) two transverse rows of brown tubercles, and there is a row of dots over the ventral legs, while over the thoracic legs is a brownish line. On each side of the head from the eyes, across the vertex, is a brownish stripe, and the vertex, the clypeus, and mouth parts are of the same colour.

The larvæ pupate in the ground, and there seem to be two generations in the year. *Opius grœcus*, Wesm., is parasitic on them.

Not common. I only know of it from Cadder Wilderness near Glasgow, Kingussie, and Wimbledon (Bridgman). The imago appears in June and August.

Its continental distribution is wide. France, Scandinavia, Lapland, Finland, Prussia, Germany, Russia, Orenburg (Ural) and Riga.

II. THE GROUP OF RUFICORNIS.

Body black, pronotum rarely lined with white. Legs white or pale testaceous, spurs generally with a subapical tooth. Wings with the first transverse cubital nervure absent or pellucid; stigma fuscous, more rarely black; costa paler, dilated in front of the stigma; costal cellule wide; basal nervure received behind the transverse costal nervure. Clypeus truncated, pentagonal area and sutures on vertex not well marked. Antennæ shorter or not much longer than thorax and abdomen, compressed, *the third joint longer than fourth in ♀, shorter or equal in ♂. Wings sometimes suffused with a fuscous tint. Breast smooth, shining, unpunctured.*

The species composing this group are of small size, and have the black bodies rarely relieved on the pronotum with white. There are three sections in the group: 1st, the section of *compressicornis* and *fulvipes* with pale testaceous legs and black antennæ; 2nd, *ruficornis*, *puncticeps*, and *abbreviatus*, which have the legs more or less black at the base and the antennæ sometimes pale beneath; and 3rd, the section containing *appendiculatus* and *oblongus*, which have the first transverse cubital nervure distinct and the pronotum lined with white.

Most of the species fall into the genus *Pristiphora*, Lat., the principal characteristic of which is the possession of one radial and three cubital cellules. The larvæ, so far as is known, are green, without any markings, and feed on trees.

Synopsis of Species.

1 (13) Legs white or yellowish-white, marked more or less with black on coxæ and femora.
2 (5) Tegulæ and edge of pronotum white, stigma pale testaceous.
3 (4) Body and antennæ longish, abdomen much longer than head and thorax together, antennæ brownish beneath. *Appendiculatus.*
4 (3) Body short, thick; abdomen shorter than head and thorax together; antennæ black, thickish. *Oblongus.*
5 (2) Tegulæ white, pronotum black; antennæ longish, filiform, clypeus slightly incised, stigma fuscous. *Hibernicus.*
6 (5) Tegulæ and pronotum black, stigma fuscous.
7 (10) Antennæ brownish beneath in ♀, flagellum entirely so in ♂; apex of coxæ and trochanters white.
8 (9) Stigma fuscous, wings slightly fuscous in middle; ♂ antennæ shorter than body, very thick. *Ruficornis.*
9 (8) Stigma black, wings hyaline; ♂ antennæ only moderately thick, as long as the body. *Fletcheri* and *nigricollis.*
10 (7) Antennæ black in both sexes, coxæ and trochanters black.
11 (12) Tibiæ clear white. *Puncticeps.*
12 (11) Tibiæ blackish. *Abbreviatus.*
13 (1) Legs testaceous, femora without black.

14 (15) Antennæ short, thick, compressed, and produced into a point at the apices of the joints; tegulæ clear white, stigma fuscous. *Compressicornis*.
15 (14) Antennæ long, filiform, not compressed; tegulæ black or dull testaceous, stigma testaceous. *Fulvipes*.

3. NEMATUS COMPRESSICORNIS.

Pl. VIII, fig. 3, Larva; Pl. XVI, fig. 3, Saw.

Tenthredo compressicornis, Fab., S. P., 38, 46; Lep. Mon., 126, 374.
Nematus platycerus, Htg., S. E. Z., i, 27.
— *vallator*, Voll., Tijd. Ent., i, 191, pl. 12; Zool., s.s. 7855; Kalt, Pfl., 558.
— *cebrionicornis*, Costa, F. N. Tenth., 20, pl. lxiv, f. 4; André, Species, i, 109; Cat., 15,* 42.
— *compressicornis*, André, l. c., 112; Cat., 15,* 41; Br. and Zad., Schr. Ges. König., xxiv, 123.
— *callicerus*, Thoms., Opus., 619, 12.

Black, shining, covered sparsely with palish down; the palpi, labrum, tegulæ and legs reddish-yellow, coxæ at the base, the apex of posterior tibiæ and the tarsi black; the femora at the base and the tibiæ paler than the other parts of the legs; cenchri large, clear white. Antennæ a little shorter than the thorax and abdomen, thickish, the joints produced on the underside; the third joint is a little longer than the fourth. The vertex is smooth, faintly punctured, almost shining; frontal sutures invisible; antennal foveæ broad, but rather shallow; clypeus almost truncated; abdomen short, thick, slightly keeled above; the cerci long, black. Wings sub-hyaline, having a fuscous tinge; the costa and stigma testaceous, almost fuscous. The third (second) transverse cubital cellule is small, almost quadrate, slightly dilated towards the apex.

The ♂ has the antennæ thicker and more compressed than in the ♀, the joints are more sharply produced beneath, and become more attenuate towards the apex; the third and fourth joints are also equal in length. The abdomen is very much attenuated towards the apex. The labrum is black.

Length 3 lines.

The larva of this species was discovered by Van Vollenhoven on a poplar (*Populus dilatata*) in May, also feeding on the Italian form according to Kaltenbach, and on *P. nigra* according to Mr. Fletcher. Vollenhoven states that when young it eats small round holes in the leaves, and around them places small white projecting points formed of dried secretion from the mouth. When forming these it commences at the leaf-stalk and emits a little of the secretion from the mouth; after the secretion is ejected it raises the head, whereupon the fluid dries; when the foot-stalk has been covered the larva turns round—it had been resting during this process with the hinder body on the leaf and the head on the leaf-stalk—and creeps round on to the leaf and raises a whole row of similar points quite close to each other. Inside of this circle it feeds; after a time it eats up the palisades and commences to construct a fresh circle on another part of the leaf. These points appear to be formed of dried bubbles and are highly iridescent. Van Vollenhoven suggests that their use may be to protect the larvæ from the attacks of ichneumons and other enemies.

When old it feeds on the edge of the leaf, eating well into its centre and not raising these palisades.

The larva has its head round, but depressed anteriorly, pale greenish, with two brownish-green stripes running obliquely across the vertex; mouth brown, eye-spots black. The body is pale green, clothed as it were with pale granules, more particularly round the spiracles and on the sides above the legs, which are green and somewhat darker at the joints.

The larval state lasts four or five weeks, after which it proceeds to pupate in the earth, the fly appearing at the beginning of July.

This does not appear to be a common species in Britain. I have only seen it from Glanville's Wootton and Worcester.

In Europe it is met with in Germany, Denmark, Holland, France, and Italy.

4. NEMATUS FULVIPES.

Pl. XVI, fig. 2, Saw.

Tenthredo fulvipes, Fall., Acta, 1808, 113, 51.
Pristiphora rufipes, Lep., F. Fr., pl. 12, f. 2; Mon., 60, 174; Ste., Ill., vii, 26, 4.

Nematus brevis, Htg., Blattw., 205, 39; Evers., Bull. Mosc., xx, 15, 7; Br. and Zad., Schr. Ges. König., xxiv, 135, 113.
— *aphantoneurus*, Foer., Verh. Ver. Rhein., xi, 323, pl. vi, f. 35 (wing); Br. and Zad., Schr. Ges. König., xxiv, 134.
— *fulvipes*, Thoms., Opus., 617, 7; Hym., Scand., i, 90, 11; Br. and Zad., Schr. Ges. König., xvi, pl. 6, f. 18 (lar.); André, Species, i, 111; Cat., 15*, 36; Cam., Fauna, 33, 18.
— *alnivorus*, Cam., E. M. M., xi, 107; Fauna, 33, 17; André, Species, i, 122; Cat., 15,* 45.

Antennæ a little shorter than the body, black, the third joint slightly longer than the fourth, the remaining joints becoming gradually shorter. Head entirely black, shining, vertex minutely punctured; mandibles piceous. Thorax and abdomen entirely shining black; tegulæ greyish-white; the sheath projecting, hairy. Wings scarcely hyaline, having a faint smoky hue in the centre, the nervures fuscous; costa and stigma obscure testaceous. Legs reddish-yellow, the apical joints of the four anterior, and almost the whole of the posterior tarsi, as well as the apices of the posterior tibiæ, black.

The ♂ I have never seen. According to Thomson it has the antennæ strongly compressed at the base, attenuate at the apex, the femora black, the anterior knees palish at the apex, and the posterior tarsi and the apex of tibiæ blackish-fuscous.

Length 1¾—2½ lines.

Ab.—*a.* Tibiæ white.
b. Coxæ black at the base.
c. Coxæ and base of femora black (*rufipes*, Lep.).*
d. Labrum white (*brevis*, Htg.).
e. Tegulæ black.

Fulvipes agrees with *compressicornis* in its body-form and general coloration. It is distinguished from it by its much smaller size, black mouth, much thinner and longer antennæ, the joints being also not produced beneath, and the tarsi are much paler, while the red tinge on the legs is much deeper. The ♂ has the femora black.

It is possible that there are more than one species included in the above description. The commonest form in this country (that which I described under the name of *alnivorus* in the belief that it was the species which Hartig described under that name in the Stett.

* Zaddach named for me a specimen with the legs entirely red *Rufipes*.

Zeit. i, 27) is a line larger than a type of *fulvipes* I received from Prof. Zaddach. The antennæ are apparently shorter and thicker, the legs are redder, and the tarsi (especially) and apex of tibiæ, black. I cannot, however, distinguish further differences between them. It is to be remarked also that neither Thomson nor Hartig makes any mention of the tarsi being black, nor of the apex of the tibiæ, but the latter point is mentioned by Eversmann. Again, Thomson says of the antennæ "articulo 3° 4° haud breviore," a statement which does not apply to any specimens I have seen.

The larva of *fulvipes*, according to Brischke and Zaddach's figure, is pale green, with the segmental divisions darker, the head marked with fuscous black on the vertex and at the sides; there is a spot in the centre of the face, and the anal segment is red. The dorsal stripe is darker and is bordered by white lines. It feeds on *Salix aurita.* Similar larvæ I have often seen, but never succeeded in rearing the flies.

I have one specimen agreeing with Prof. Zaddach's from near Glasgow. The larger form is tolerably common; I have it from Clydesdale, Kintail, Rannoch, Braemar. Stephens' specimens were from the London district.

On the Continent it has a wide distribution, being found in Lapland, Sweden, Germany, France and Russia.

5. NEMATUS HIBERNICUS.

Pl. XV, fig. 4, Saw.

Nematus hibernicus, Cam., E. M. M., xiv, 225; André, Species, i, 125; Cat., 19,* 112; Br. and Zad., Schr. Ges. König., xxiv, 348, 86*a*.

Antennæ a little shorter than the thorax and abdomen, black, moderately stout, of nearly uniform thickness; third joint a very little longer than the fourth, the others becoming very gradually shorter, the last conical, one-third shorter than the third. Head a little narrower than the mesothorax, vertex finely punctured, covered with short down, shining; clypeus and labrum white, the former with a slight emargination. Thorax black, covered with short down; the tegulæ white. Legs white, the basal half of the two anterior, and nearly the whole of the posterior femora, the apical fourth of posterior tibiæ and the apical three-fourths of the posterior tarsi black. Wings hyaline, the costa and stigma sordid white; the first transverse cubital nervure is absent; in the second cubital cellule is a horny point; the third cellule is almost a parallelogram; the second recurrent nervure is received immediately in front of the second transverse cubital. Abdomen black, a little longer than the thorax and head, broad, the apex acuminate; cerci small, thin, the saw projecting, broad.

Length 1¾ lines.

In the absence of the first transverse cubital nervure, in the punctured vertex with invisible suture and pentagonal area, this little species agrees with those of the *ruficornis* group, but the clypeus is slightly notched and white, and the antennæ do not taper so much towards the apex. Judging from the description, it must be a very close ally of *N. filicornis*, Thoms. (which Thomson states agrees with *N. fulvipes* and its allies, but differs in the emarginated clypeus, while the antennæ resemble those of *Blennocampa*), but it differs from that species in many points. Thus Thomson gives the antennæ as being "breves, corpore dimidio evidenter breviores," while in *hibernicus* they are decidedly longer; the third joint, too, is not one-third longer than the fourth, nor can the wings be said to be "lenissime fumatis;" *filicornis*, again, has the middle tibiæ marked with black and the tarsi testaceous, the tegulæ, being "fusco-testaceous."

Rare. County Wicklow (King), Norwich (Bridgman).

6. NEMATUS PUNCTICEPS.

Pl. XVI, fig. 1, Saw.

Nematus puncticeps, Thoms., Opus., 619, 10; Hym. Scand., i, 92, 14; André, Species, i, 114; Cat., 16*, 48; Cam., Fauna, 34, 22; Br. and Zad., Schr. Ges. König., xxiv, 144.

Black, shining; the knees, tibiæ, and tarsi white, the apex of the posterior tibiæ and the tarsi black. Wings very faintly obscured, the costa and stigma dark testaceous. Antennæ a little shorter than the body.

The ♂ has the antennæ thickish.

Length 2¼ lines.

Ab.—a. ♀. Trochanters white.

The black antennæ, labrum, and basal parts of the legs, as also the black posterior tarsi, will readily serve to indicate this species.

The larva, according to Brischke, feeds on birch; it is green, the anal segment carmine red, smooth, very shortly and finely haired. From the fourth segment the dorsal canal is darker than the body, it being blackish green, and is bordered on either side by a white line which ends at the eleventh segment. The blackish-brown spiracles are bordered by a narrow pale line. Head smooth, yellowish-green, finely punctured with brown, the brown points forming a dark mark on the vertex. Mouth and antennæ brown, as are also the claws of the feet. When the larvæ are mature the white dorsal lines disappear.

The eggs are laid in pockets in the teeth of the leaf. There are two broods in the year.

It seems to be rare compared to the others of the group. I have only seen a ♀ and ♂ from Clydesdale, the ♀ being the aberration, which is also noticed by Thomson, who says that the species occur all over Scandinavia. Italy (Magretti).

7. NEMATUS ABBREVIATUS.

Nematus abbreviatus, Htg., Blattw., 205, 38; Voll., Tijd. Ent., v (2), 59, pl. 1 (lar., &c.); Ent., No. 140, 49; Kalt., Pfl., 200, 781; Cam., Fauna, 34, 22; André, Species, i, 130; Cat., 16,* 56; Br. and Zad., Schr. Ges. König., xxiv, 136.

Black, half shining, covered with short down; vertex finely punctured; pleuræ opaque, coarsely punctured. Knees, anterior tibiæ and tarsi sordid testaceous; posterior tibiæ fuscous; labrum piceous.

Antennæ as long as the body, rather thick, the third and fourth joints equal. Wings hyaline, iridescent, the costa and stigma whitish testaceous; the tegulæ greyish; the second cubital cellule is almost a parallelogram; the second recurrent nervure is received considerably in front of the transverse cubital one. The back of the abdomen is somewhat keeled, and at the apex there is a large depression on each side of the carina.

Length 3 lines.

The above is the description of the ♂, the only sex I have seen. According to Hartig the ♀ has the antennæ a little longer than the abdomen, the hinder part of the pronotum reddish, and the coloration of the legs is somewhat clearer. According to Van Vollenhoven the tips of the coxæ have a reddish hue.

Van Vollenhoven says that the larva feeds on the apple, in the leaves of which, when it is young, it devours round holes in the centre, feeding in a curved position on the edge of the hole which it has bitten out. When it becomes older it feeds indifferently on the edge of the leaf or on any other part. The colour of the larva is green, which when the creature is young has a yellowish tinge; when older the colour becomes of a greyish-green along the back, the belly and legs being paler and of a tinge approaching to yellow. The head is of a faint brown tint or very pale *feuille-morte*. The body is somewhat slender, smooth, hairless, a little narrowed posteriorly. On each segment are two rather thick folds reaching to the spiracles; of these, that on the first segment only is conspicuous, being comparatively large and bordered with black, the others are much smaller and have white borders. The mandibles are brownish and the eye-spots are black. The legs are longish. There are no abdominal legs on the anal segment.

The larvæ are found in May, the imagos appearing in April and May. Kaltenbach states that the larvæ feed likewise on the pear, on which in Switzerland they appear in great numbers and commit damage to these trees. The pupa state is passed in the earth.

I have only seen a single male of *abbreviatus*, taken by Dr. Sharp in Braemar.

It has been recorded from Germany, Switzerland, Holland.

8. NEMATUS RUFICORNIS.

Pl. X, fig. 2, Larva; Pl. XV, fig. 5, Saw.

Nematus ruficornis, Olivier, Enc. Méth., viii, 167; Lep., Mon., 71, 216; Ste., Ill., vii, 36, 37; Cam., Proc. N. H. S. Glas., iii, 310; André, Species, i, 124; Cat., 16,* 51.
Pristiphora testaceicornis, Lep., F. Fr., pl. 12, f. 1; Mon., 60, 172?; Ste., Ill., vii, 26, 5.
Nematus fraxini, Thoms., Opus., 618, 9; Hym. Scand., i, 91, 13; Eversmann, Bull. Mos., xx, 15, 4; Cam., Fauna, 34, 21.

Antennæ nearly as long as the thorax and abdomen, moderately stout, tapering very slightly towards the apex, the third joint a very little longer than the fourth; the two basal joints black, the rest dull brownish-red, darker on the upper surface. Head black, a little narrower than the mesothorax, covered with scattered pubescence; the vertex punctured, half-shining, the front wide, projecting, pentagonal area not defined; the antennal fovea well marked, clypeus truncated, labrum pale brown, palpi pale white. Thorax black, shining, covered with dark down; tegulæ pale, varying to black; cenchri small, clear white. Legs white, with a slight yellowish tinge, coxæ at base, the basal fourth of the anterior, half of intermediate and nearly the whole of the posterior femora, the apex of posterior tibiæ and the apical joints of the posterior tarsi, black; calcaria nearly as long as the half of the metatarsus; second joint of tarsus as long as the fifth. Wings hyaline, with an obscure cloud in the middle, the costa pale white, stigma fuscous, darker at the base. The first transverse cubital nervure is absent, in the second cellule is a horny point; third cellule small, nearly square; the second recurrent nervure is received about the length of the third cellule in front of the second transverse cubital. Abdomen longer than the head and thorax, broad, inflated in the middle; the cerci small.

The ♂ has the antennæ short, thick, compressed, red, the two basal joints black, the wings short, with the third cubital cellule small.

Length 2—2¼ lines.

This seems to be a variable species. The antennæ are sometimes quite black, so also are the labrum and the greater part of the four anterior femora. In the typical form all the joints of the posterior tarsi are more or less white at the base, the basal having only the extreme tip black, but a not uncommon aberration is met with having the entire tarsus black. The shape of the third cubital cellule also varies, some individuals having it more widened at the apex than in others. The tegulæ are generally pale, but often they are blackish. The wings are sometimes scarcely clouded in the centre.

I have no doubt the species described above is the *fraxini* of Thomson, but I am not at all sure that it is the *fraxini* of Hartig; for, *inter alia*, that is described as having the labrum white and the antennæ "scarcely longer than the abdomen," while in the species I have described they are nearly as long as the thorax and abdomen. The ♂ of *fraxini* is not described by Hartig; Thomson merely says that it has the antennæ pallid red, black at the base. I have a German specimen which agrees with Hartig's description; it has the labrum white, the antennæ shorter and thicker than in *ruficornis*, abdomen shorter, broader, and the costa is of the same colour as the stigma, namely brownish, as Hartig describes it; the femora, furthermore, have not so much black on them, and the claws have a sub-apical tooth.

I am also not sure if it be the *fraxini* of Brischke and Zaddach (Schr. Ges. König., xxiv, 139). The larva of this is stated to feed on the lime; it is shining green, wrinkled, the head brown with a darker mark on vertex, and there is also a brown mark over each eye uniting with the larger mark on vertex; mouth brown. So far as their description of the imago goes, it agrees tolerably well with the above-described species.

N. crassicornis differs from *ruficornis* in having the stigma black, the costa white, antennæ thick, especially at the base, compressed, and as long as the thorax and abdomen; and Thomson further separates it from his *fraxini* by the claws being bifid. *N. Fletcheri* may be known from *ruficornis* by the abdomen being shorter compared to the head and thorax; the stigma is black or fuscous black; the nervures being darker, and there is no fuscous cloud in the middle of the wing; the posterior tarsi are black entirely, and the antennæ if anything are longer and taper apparently more towards the apex. I doubt, however, if these characters will be sufficient to enable the two species to be separated.

From *appendiculatus* it differs in the longer tarsi and shorter calcaria, thicker antennæ; and the coloration of the stigma and legs is different; the third cubital cellule being also smaller. *Puncticeps* agrees with it very closely, and I think that it will prove to be a variety of *ruficornis*, varying from it merely in having the antennæ, labrum, coxæ, trochanters, and femora black, and, as we have seen, *ruficornis* shows considerable variation in the colour of these parts. Thomson, however, states that the antennæ in *puncticeps* are thinner than in *ruficornis*.

The larva feeds on willows (*Salix viminalis*, *vitellina*, &c) and birch in July, and there is a second brood during the autumn. It is green, the body long; the head is paler than the body and has a line on each side touching the eyes, but not uniting on the top, and another goes down the centre of the face; mouth brownish. There are two blackish marks over the thoracic legs, and another small one in front of the first pair. When full fed it becomes of a yellowish-green colour. The cocoon is spun in the earth, the pupa being green. The larvæ eat along the edge of the leaf.

From this description it is seen that the larva agrees very closely with that of *appendiculatus*. I have also seen specimens with the head dotted over with fuscous.

Perilissus filicornis, Gr., preys on it.

Ruficornis is one of our commonest saw-flies, and is met with in all districts, the imagos appearing early in June. It occurs in Lapland, Scandinavia, Germany, Holland, France, Switzerland, Austria and Russia.

9. NEMATUS FLETCHERI.

Pl. IV, fig. 2, ♀ ; Pl. XV, fig. 6, Saw.

Nematus Fletcheri, Cam., E. M. M., July, 1884, p. 26.

Black; antennæ brownish beneath, as long as the thorax and abdomen, tapering towards the apex; tegulæ, apex of coxæ, trochanters, base and apex of four anterior femora, extreme base and apex of posterior, four anterior tibiæ and tarsi, and posterior tibiæ, except the apex, white. Wings hyaline, costa fuscous, stigma blackish. Claws with a sub-apical tooth.

Length 2½—2¾ lines.

The ♂ I have not bred, but a caught specimen from Thornhill must, I think, either belong to it or to *nigricollis*. It has the antennæ as long as the body, the third joint a little compressed, and they taper perceptibly towards the apex.

The larva feeds on hawthorn, eating the leaves along the edge against which the body is closely pressed. It is bright green, the anal segments red, the head brownish. I was unable to make a minute description of it owing to all the specimens I had spinning up.

N. cratægi, Zad. (Schr. Ges. König., xxiv, p. 147), appears to be very closely allied to this species, but it would seem to differ in having the labrum, mandibles, and the edge of pronotum white, the antennæ red, except the basal two joints, which are black, and the apex of the middle tarsi and the base of posterior are reddish-yellow.

The larva of *cratægi* (which feeds on the hawthorn) is green with a darker dorsal vessel, the head yellowish, its vertex with a broad brown stripe, there being also three stripes on the sides and face. The last segment is rose red.

Clydesdale, Worcester.

10. NEMATUS NIGRICOLLIS, *n. sp.*

Pl. IX, fig. 5, Larva; Pl. XV, fig. 7, Saw.

In coloration this form agrees entirely with *N. Fletcheri;* in other respects I am unable to find tangible points of distinction; perhaps if anything the antennæ are shorter and thicker, and there is a slight difference also in the structure of the saw.

The larva is green, the anal segment blue. There is a triangular black mark over each leg, and an oblique one in front of first pair. Head light brown; a black band extends from above each eye to near the top, and a black line runs from the back down the centre of the face, where there is a lighter round mark. The marks on legs are sometimes very pale and the anal segment is not always blue, sometimes being of a reddish hue.

Whether it is a good species must be a doubtful point at present, but the larvæ were more slender in the body, which was green as in *Fletcheri;* the two last segments were light blue, clearly separated from the green, while in *Fletcheri* they were of the same tint as the body, with the apex tinted sometimes with red. They were found by Mr. Fletcher on hawthorn at Worcester.

11. NEMATUS APPENDICULATUS.

Pl. I, fig. 9, ♀; Pl. VIII, fig. 4, Larva; Pl. XV, fig. 3, Saw.

Pristiphora pallipes, Lep., Mon., 60, 173; Ste., Ill., vii, 25, 3 (nec Fall.).
Nematus flavipes, Dbm., Consp., 9, 102.
— *appendiculatus*, Htg., Blattw., 202, 34; Thoms., Opus., 618, 8; Hym. Scand., i, 91, 12; Voll., Tijd. Ent. (2), v, 55—58, pl 1 (lar., ima., &c.); Ent., No. 141, 76—78; Gimmerthal, Arbeit. d. naturforsch. Vereins zu Riga, i, 330 (lar.); Kalt., Pfl., 261; André, Species, i,

112; Cat., 15,* 43; Cam., Fauna, 33, 20; Brischke, Schr. Ges. König., xxiv, 134, pl. 7, f. 9 (lar.).
Nematus cathoraticus, Foer, Verh. Ver. Rheinl., xi, 325, t. vi, f. 36.
— *Peleteri*, André, Species, i, 111; Cat., 15,* 37.

Smooth, shining, covered with a silky pubescence, the vertex finely punctured, black; labrum testaceous; tegulæ and basal edge of pronotum white. Legs white, with a yellowish tinge, the coxæ black at the extreme base; femora with a reddish tinge, suffused in the middle with fuscous; apex of posterior tibiæ and the apical joints of the tarsi black. Antennæ a little shorter than the body, black, the apical joints brownish beneath, moderately stout; the third joint a little longer than the fourth; apex of clypeus truncate. Abdomen longer than the head and thorax, broad, stout, keeled above, the apex bluntly rounded; cerci short, the saw scarcely projecting. Wings subhyaline, iridescent; the costa and stigma obscure testaceous; the transverse cubital nervure absent; the second recurrent nervure is received considerably in front of the second transverse cubital; the third cubital cellule is small, very slightly widened at the apex; in the second cellule is a distinct horny point.

The ♂ (*teste* Thomson) has the antennæ a little thickened at the base, slightly attenuate at the apex, fuscous-testaceous, the posterior femora nearly all black, and the posterior tarsi fuscous.

Length 3—3½ lines.

There are two well-distinguished forms of this insect. One like that described above: the other has the body more shining, not so pubescent, the extreme apex of the clypeus of the same colour as the labrum, the antennæ quite black; the first transverse cubital nervure is well defined; the pronotum is rather broadly edged with white along its whole length. A specimen from Sutherlandshire has the antennæ (apparently) longer than usual; the extreme base of the pronotum only is white, while the posterior femora are black and the four anterior at the base, the general coloration of the legs being also darker, the posterior tarsi being all black; the first transverse cubital nervure is distinct. In a few specimens the legs are of an almost uniform colour, and more rarely the mouth parts are fuscous, or even black. Most of the specimens that I have examined have the antennæ black; it is very rare to find examples with the first transverse cubital nervure entirely obliterated, and even rarer is it to find specimens without any white on the pronotum.

Vollenhoven figures it with the first transverse cubital nervure very distinct.

The larva has been described by Gimmerthal and Vollenhoven. It has the head somewhat depressed anteriorly; its colour greyish-green, the eyes being placed in rather large round black spots; from each of these spots proceeds a brown line, narrowing gradually and going to the top of the head where the lines join. About the mouth parts are some small brown spots, and the tips of the mandibles are of the same colour. The body is rather long and slender. Above the line of the spiracles it is strongly wrinkled, there being five folds to each segment. The second and eleventh segments, the edges of the spiracles, the middle and posterior legs and the top of the anal segment have a green-yellow tint; the rest of the body is green; legs greenish, with brown claws; there is an oblique mark on each of the thoracic.

Usually it feeds lying at full length along the edge of the leaf, with the posterior segments slightly curved. It feeds on *Ribes rubrum* and *R. grossularia* to which, when they occur in numbers, they are injurious. It appears in June, spins its little shining cocoons in the earth, and emerges in the perfect state in July, there being two generations in the year.

Appendiculatus, although widely distributed, does not appear to be very common in this country. I have taken it in Clydesdale, Braemar, and Sutherlandshire. In England it is found in the Manchester district, York (T. Wilson), Gloucester, around London, Glanville's Wootton, and Devonshire.

Continental habitats are: Scandinavia, Germany, Holland, France, Russia (Riga).

Obs.—It is doubtful if this is *pallipes*, Lep., for the mouth and tegulæ are said to be ferruginous, which is not the case with any of the specimens I have seen; but it is difficult to see what other species *pallipes* can be.

12. NEMATUS OBLONGUS.

Nematus oblongus, Cam., Trans. Ent. Soc., 1882, 539.

Black; labrum, tegulæ, the greater part of upper lobe of pronotum, and anal segment above, sordid white; coxæ, except base, trochanters, anterior tarsi, and tibiæ whitish-yellow, femora reddish-yellow; apex of posterior tibiæ and tarsi black. Antennæ thick, as long as abdomen and metathorax, tapering slightly towards the apex, the joints not clearly separated at the base, more sharply at the apex. Wings hyaline, basal third of costa white, the remainder and stigma fuscous; first transverse nervure pellucid; third cubital cellule a little longer than broad, slightly dilated at the apex. Head thick, not dilated behind the eyes, vertical and frontal sutures invisible, pentagonal area invisible; clypeus truncated; head, mesonotum, and upper half of pleuræ finely punctured. The spurs not much more than one third the length of metatarsus.

What is probably the ♂ has the antennæ thick throughout, but tapering towards the apex, pilose, black above, brownish beneath; cerci and apical segment pallid testaceous, and the femora slightly marked with black above. Otherwise as in ♀.

Length scarcely 2¼ lines.

Closely allied to *appendiculatus*, but is smaller, broader, the antennæ thicker and shorter, vertex thicker and sutures invisible or nearly so. It comes very near to *aquilegiæ*, Vol., but that species would appear to have the pronotum entirely black, as well as the apex of the abdomen; the wings are darker in tint; the antennæ in the ♂ are longer and much more distinctly compressed laterally and not so much thickened.

An English specimen without note of exact locality. The ♂ is from Clober, where it was taken on 5th June.

13. NEMATUS FUNERULUS.

Nematus funerulus, Costa, Fauna Nap., Tenth., p. 20, pl. lxiv, f. 5 (1859); André, Species, i, 115; Cat., 16*; Kirby, List of Hymen., i, 122.

Black; labrum pale brown, tegulæ dirty white; legs white, the four anterior coxæ, the lower part of trochanters, basal half of anterior femora, the posterior entirely except the knees, and the apex of posterior tibiæ and their tarsi black. Wings hyaline, slightly clouded, nervures black, stigma brown, clearer in the ♀.

Length 3 lines.

"Britain, J. F. Stephens"; Kirby, l.c. Unknown to me.

Continental distribution: Pyrenees, Italy.

Obs.—Brischke and Zaddach (Schr. Ges. König., xxiv, p. 126) regard *N. funerulus* as identical with *N. laricis*, Htg., (Blattw., 203, 35). Not having seen the specimen in the British Museum recorded by Mr. Kirby I am scarcely in a position to offer an opinion on the matter; but, judging by the description given of *funerulus*, *laricis* seems to differ from it in having the pronotum edged with pale testaceous, the apex of abdomen more or less of the same colour, and the stigma clearer, being reddish-yellow or clear brown.

III. THE GROUP OF AMBIGUUS.

Black; mouth, pronotum, apex and ventral surface of abdomen, pale or testaceous. Antennæ shorter than the body, black, sometimes pale beneath. The eyes are usually more or less bordered with testaceous; the mesonotum is finely punctured, the vertex is more roughly punctured. Clypeus truncated at the apex. Wings having a white, testaceous, or fuscous stigma; the first transverse cubital nervure may be absent or present. Abdomen compressed at the sides towards the apex; above distinctly carinated.

The group has considerable affinity with Group III, but, *inter alia*, differs from it in the punctured mesonotum and in the much greater extension of the white, or testaceous colour on the thorax and abdomen, as well as in the form of the latter. Most of the species are attached to *Coniferæ*.

14. NEMATUS AMBIGUUS.

Pl. IV, fig. 3, ♀; Pl. XVI, fig. 5, Saw.

Tenthredo ambigua, Fall., Acta Holm., 1808, 112, 50.
Nematus furvescens, Cam., P. N. H., Glas., ii, 308 (1877); Fauna, 33, 15; André, Species, i, 139; Cat., 26*, 215.
— *parvus*, Htg., Blattw., 208, 43; Br. and Zad., Schr. Ges. König., xxiv, 125, 99.

Nematus ambiguus, Thoms., Opus., 624, 22; Hym. Sc., i, 109, 33; André, Species, i, 148; Cat., 26, 211.

Head much narrower than the thorax, shining, punctured, the face below the antennæ whitish-testaceous. Antennæ bare, black, thin, decreasing very perceptibly in thickness towards the apex, the third joint apparently longer than the fourth; in length the antennæ are longer than half the body, if not longer than the abdomen. Thorax black, shining, mesonotum very finely punctured, half shining, pronotum pale testaceous; the cenchri are scarcely visible. Legs white with a testaceous tinge, the femora with a broad black line on the upper side, beneath with a black or fuscous line; posterior tarsi and apex of tibiæ dark fuscous, almost black, the base of the tarsi being paler, posterior tarsi equal to, if not longer than, the tibiæ. Wings scarcely hyaline, having a fuscous tinge, especially at the apex, the costa and stigma testaceous; the first transverse cubital nervure very faint; second recurrent received slightly in front of the second transverse cubital; the second cubital cellule has a horny point in the centre; the third is small, nearly square. Abdomen black, broader at the base than the thorax, the apex bluntly pointed and pilose; the saw scarcely projects, the external part surrounding it is testaceous, and the posterior part of the ventral surface is of the same colour.

The ♂ is smaller, and the antennæ are thicker, the orbits are broadly marked with testaceous, and there is a broad testaceous splash on the pleuræ; the anal segment above and the posterior half of the ventral surface are of the same colour. Also the posterior tibiæ have more than the apical half black; the antennæ are quite black.

Length 2—2¼ lines.

Ab.—*a.* ♂ pleuræ without a testaceous splash.

b. ♂ femora not lined with black.

According to Hartig the larvæ feed on the red pine and are green. It does not appear to be very common. I find it on the larch near Glasgow in May. Mr. Dale takes it in Dorsetshire.

Continental distribution: Sweden, Germany.

IV. THE GROUP OF MOLLIS.

Body short, thick-set; vertex thick, strongly punctured; mesonotum finely punctured, pleuræ coarsely punctured, opaque or semi-opaque. Black, apex of abdomen white, or testaceous, pronotum usually lined with white; legs white or pale testaceous, the base and more or less of femora black. Antennæ short, seldom longer than abdomen and thorax, black, very rarely brownish beneath.

Wings hyaline, stigma white, or livid testaceous; first transverse cubital nervure present. Saw short, thick, with coarse serrations, rarely much projecting; the claws have generally a subapical tooth.

The distinctly punctured thorax, and especially its sides, readily distinguishes this group from others of similar coloration, *e.g.* from *placidus* and *Thomsoni;* the latter also differing in its emarginated clypeus, and the former has the antennæ much longer and thinner.

The species are northern forms, occurring mostly on mountain tracts—some on our highest mountain tops —or in pine forests.

Synopsis of Species.

1 (2) Legs clear white except the coxæ and hind tarsi. ***Leucopodius.***
2 (1) Legs with the femora black.
3 (4) Mesonotum smooth, shining, unpunctured; antennæ shorter than abdomen, brownish beneath. ***Scoticus.***
4 (3) Mesonotum punctured, opaque, or semi-opaque; antennæ black.
5 (6) Frontal area distinct, third cubital cellule considerably dilated at the apex, stigma fuscous. ***Mollis.***
6 (5) Frontal suture indistinct; third cubital cellule scarcely dilated at apex.
7 (8) Stigma dark fuscous; antennæ as long as the body in ♀. ***Fraternus.***
8 (7) Stigma testaceous; antennæ not longer than body.
9 (10) Antennæ as long as the thorax and abdomen in ♀, as long as the body in ♂, clypeus white. ***Breadalbanensis.***
10 (9) Antennæ not much longer than abdomen in ♂ and ♀; clypeus black.
11 (12) Labrum white, spurs half of the length of metatarsus; wings not much longer than body. ***Astutus.***
12 (11) Labrum black; spurs one-third of length of metatarsus; wings longer than body. ***Lativentris.***

15. NEMATUS SCOTICUS.

Pl. XVI, fig. 6, Saw.

Nematus scoticus, Cam., Trans. Ent. Soc., 1881, 563.

Black; head and thorax covered with close pubescence, which is especially long on the face; labrum, legs, and apex of abdomen, dull testaceous; mandibles brownish, palpi, dark testaceous; the greater part of coxæ, a line on the under side of anterior femora, one above and beneath on middle, and the greater part of posterior, black; apex of posterior tibiæ and tarsi fuscous. Vertex minutely punctured, antennal fovea long, broad, and moderately deep, frontal area indistinct. Antennæ as long as abdomen, thickish, the third and fourth joints about equal, and not shorter than ninth, which is sharply conical at apex; black, brownish from third joint beneath, and slightly pilose; mesonotum shining, scarcely punctured; pleuræ opaque, punctured; sternum smooth, shining; tegulæ testaceous. Wings hyaline, nervures for the greater part, and costa and stigma livid white; first transverse cubital nervure distinct; third cubital cellule longer than broad. The spurs do not reach to the middle of metatarsus; claws with a minute subapical tooth; the cerci are longer than spurs; sheath of saw with a long hair-fringe.

Length 2½ lines.

Agrees with the *Ambiguus* group in having the antennæ brownish beneath, but differs in the punctured pleuræ, black pronotum, and clypeus. It differs from *N. breadalbanensis* and its allies in its more shining body, in having the antennæ brownish beneath and the pronotum black. It has the legs coloured much as in *N. lativentris*, but the body is narrower, more shining, and less punctured, the costa and stigma of a more livid white, the third cubital cellule shorter, and the apex of abdomen is more marked with testaceous.

Taken in Braemar by Dr. Sharp in June.

16. NEMATUS FRATERNUS.

Pl. IV, fig. 1, ♀

Nematus lætus, Cam., Trans. Ent. Soc., 1883, 194; *non* Cresson.

Black; mouth and legs dirty white; the coxæ at base, posterior and middle femora almost wholly above and beneath, the anterior in the middle, the apex of hind tibiæ and tarsi, black; tegulæ black, the pronotum close to them dull white. Wings hyaline; nervures and stigma dark fuscous, the costa paler. The body is broad, and is covered closely with short close pile; the head and thorax almost opaque, very finely punctured all over. The vertex is thick and has the sutures very indistinct; the frontal area is not indicated. Clypeus almost transverse at apex. Antennæ nearly as long as the head and thorax together; sheath of saw large, projecting, covered with dense pubescence; the extreme apex of abdomen above dirty white; cerci small; the third cubital cellule is a little longer than broad; the transverse median nervure is received nearly in the middle of the cellule; the wings are large, being longer than the body. ♀.

Length 1¾ lines.

Agrees closest with *N. scoticus*, but is smaller, has the antennæ quite black, longer and thinner, the sutures on vertex less deep and the mesonotum much more strongly punctured. From the species with punctured mesonotum it may easily be known by its smaller size, fuscous black stigma, longer and thinner antennæ, and shorter and blacker cerci.

Mickleham, in May (Mr. T. R. Billups).

17. NEMATUS MOLLIS.

Pl. XVII, fig. 1, Saw.

Nematus mollis, Htg., Blattw., 201, 30; Thoms., Opus., 621, 16; Hym. Scand., i, 98, 22; André, Species, i, 131; Cat., 14, 28; Br. and Zad., Schr. Ges. König., xxiv, 129, 105.

Tenthredo lapponica, Zett., Ins. Lapp., 350, 44.

Antennæ a little shorter than the body, rather stout, black, the fourth joint shorter than the third, the rest shorter and thinner. Head narrower than the thorax, black; the tips of mandibles brownish, palpi dark testaceous; scarcely shining, covered with close down and faintly punctured, the pentagonal area distinct, fovea between the antennæ large. Thorax black, shining, obscurely punctured, the pleuræ opaque, densely punctured, pronotum broadly edged with pale testaceous; the cenchri large, dull white. Abdomen longer than the head and thorax, nearly cylindrical, black, sheath of saw a little projecting; the cerci are longish, pale. Legs obscure whitish-testaceous, the coxæ at the base, the base of anterior femora widely, and nearly the whole of the posterior black; posterior tarsi slightly darkened, spurs long, but not reaching beyond the middle of the basal tarsal joint. Wings hyaline, the costa and stigma pale testaceous, nervures blackish, paler at the base; the second cubital cellule is nearly double the length of the third, widened and angled considerably where it receives the first recurrent nervure, and having a distinct horny dot at the apex; the third cellule is narrow at the base, rather wide at the apex; the first transverse cubital nervure is pale, the tegulæ are pale testaceous.

The ♂ has the antennæ thicker and more compressed than in the ♀, the posterior femora almost entirely, the anterior largely at the base, and the apex of posterior tibiæ, fuscous.

Length 3¼ lines.

Ab.—*a.* Labrum white.

b. Edge of pronotum black.

This insect is distinguished by its hyaline wings with testaceous stigma, pale testaceous pronotum, tegulæ, and legs, and black femora.

It seems to be a northern form, having only been taken in Rannoch and Braemar in June, and very few specimens have been captured.

Continental distribution: Lapland, Sweden, the Harz Mountains, Prussia, France.

Nothing definite is known about its early stages, but according to Hartig the imago occurs on pines.

18. NEMATUS WHITEI.

Nematus Whitei, Cam., Fauna, i, 25, 29 (1878).

Black, anal lobes, tibiæ, and tarsi testaceous. Wings hyaline, the costa and stigma fuscous.
Length nearly 3¼ lines.

I am only acquainted with the ♂ of this species, which is very distinct from anything described, and doubtless belongs to this group. It closely resembles the ♂ of *N. breadalbanensis*, but the head is scarcely so rugose; the labrum, clypeus, and palpi are quite black, mandibles scarcely piceous, the pleuræ not so much punctured, a little smoother, and more pubescent; the mesonotum is shining, the coxæ, trochanters, and femora (except at the extreme apex) are quite black, and the posterior tarsi fuscous. The wings are clear hyaline, costa and stigma fuscous, the third cubital cellule longer and more dilated at apex. The frontal sutures are not so distinct. The body (especially the head, pleuræ, breast, and sides of abdomen) and legs densely covered with griseous pubescence; breast alutaceous, scutellum transverse behind, foveæ below the antennæ large, deep; spurs scarcely one-third the length of metatarsus.

It is very similar to the ♂ of *N. breadalbanensis*, but the antennæ are shorter, the pubescence less dense and shorter, stigma darker, third cubital cellule longer and more dilated at apex, and spurs shorter.

André and Kirby treat *Whitei* as the ♂ of *N. lati-*

ventris, Thoms., but the densely pilose body shows beyond dispute that it has no relationship with Thomson's species.

Braemar (Dr. Buchanan White).

19. NEMATUS BREADALBANENSIS.

Pl. I, fig. 6, ♀ ; Pl. XVII, fig. 2, Saw.

Nematus pallipes, Cam., E. M. M., x, 211; Proc. Nat. Hist. Soc. Glas., ii, 311; Fauna, 35, 28, *nec* Fall.
— *breadalbanensis*, Cam., Trans. Ent. Soc., 1882, 531.

Black; apex of clypeus, labrum, and palpi white; legs pale testaceous. The coxæ, except at extreme apex, trochanters in part, basal two-thirds of anterior femora, and posterior almost wholly, black, with the apex of posterior tibiæ and tarsi fuscous. Head roughly punctured, opaque, slightly pilose, scarcely broader than mesothorax; vertex thick, front projecting, labrum sub-quadrate; mandibles piceous. Thorax black, scarcely shining, covered with sparse pubescence, minutely punctured; pleuræ punctured, opaque, and covered with close, short pile; the edge of pronotum and tegulæ pale testaceous; cenchri of medium size. Abdomen longer than head and thorax; anal part testaceous. Antennæ as long as the body, stout, black, the third and fourth joints about equal, the third slightly curved, longer than the longitudinal diameter of the eye. Wings hyaline, nervures testaceous at base, black at apex, costa and stigma testaceous white. Calcaria one-third of the length of metatarsus; second joint of tarsus longer than fifth. ♂.

The ♀ has the antennæ as long as the thorax and abdomen, and they are more slender than in the ♂, the black on apex of posterior tibiæ is less (in ♂ it sometimes reaches to near the base of tibiæ, while in other specimens it scarcely exists on tibiæ or tarsi), and the anal segment is dirty-white above. The size of the third cubital cellule varies, it being sometimes as long as broad, and it may be much longer than broad; the second recurrent nervure is, in most of the females I have seen, joined to third transverse cubital nervure or nearly so, but in one or two specimens it is at some distance from it, which is its normal position in most males. The testaceous colour on pronotum varies in extent, and may be entirely absent in both sexes.

Length 3—3½ lines.

The above species comes near to *N. pallipes*, Fall., from which, however, it differs in two important points: 1st, in having the coxæ black, while *pallipes* has them testaceous, and it has only a thin black line or splash on the femora; and 2nd, in the spurs not reaching the middle of metatarsus. I have not seen the ♂ of *pallipes*, but judging from the ♀ that species would seem to be a broader and stouter insect than *breadalbanensis*, and the posterior tarsi are of a blacker testaceous, the band on pronotum is broader, and the apical segments of abdomen broad and dirty testaceous.

Breadalbanensis would appear to be an Alpine species. I captured it on a mountain in Rannoch in June, at an elevation of about 3000 feet. Near where it was captured I found in moss a good many cocoons of a *Nematus* presumably of this species. Similar cocoons I have seen in like situations and at the same altitude on many of our Scotch mountains. I discovered both sexes in numbers on Ben More, Mull.

20. NEMATUS ASTUTUS.

Pl. XVII, fig. 3, Saw.

Nematus carinatus, Htg., Blattw., 199, 28; Kalt., Pfl., 700; André, Species, 1, 148, 147. ?

Black, thick; head as broad as the thorax; antennæ thick, as long as the abdomen, the third and fourth joints about equal, the apical joints thinner; labrum white, mandibles piceous, palpi dirty white; apex of abdomen, cerci, tegulæ, and a thin line on pronotum close to tegulæ brownish-testaceous. Wings hyaline, costa and stigma yellowish-white, nervures pale at base of wing, darker at apex. Legs black, apical half of anterior femora, the knees of posterior tibiæ and tarsi, brownish-testaceous, apex of posterior tibiæ and tarsi fuscous black; the extreme apex of coxæ and trochanters on underside testaceous. Cerci as long as second joint of posterior tarsi; sheath pilose, projecting.

Length 3½ lines.

I formerly considered the species above described as the ♀ of *N. pallipes*, but I now think it must be distinct. It is much broader, the head is much thicker, the clypeus black, cenchri larger, while the coloration of the legs is darker, and the clypeus is not so sharply truncated at the apex. The furrow on the middle lobe of the mesonotum is very deep, and there is a raised ridge running down the centre of the scutellum, which is not visible in *pallipes*. In the latter, also, there is a transverse furrow running across the apical third and dividing the scutellum as it were in two. This species cannot certainly be *pallipes*, Thoms., for that has the antennæ as long as thorax and abdomen, the pronotum is almost entirely pale, the cerci short, the abdomen is "almost cylindrical," while in *carinatus* it is broad and flat, broader in the middle than the thorax, ending in a blunt point at the apex, the testaceous colour on apex too being much less. Besides these differences *pallipes* has the legs, including coxæ, almost entirely testaceous.

It agrees tolerably well with the description of *carinatus*, of which the ♂ only has been described by Hartig, but the ♀, according to Zaddach (Schr. Ges. König., xxiv, p. 129), has the legs fulvous, the antennæ longer and more slender than in *mollis*, which is certainly not the case with the present species; the edge of the pronotum is fulvous. Zaddach gives *N. aquiligeæ*, Vol., as a synonym of *carinatus*, and he also quotes *pallipes*, Thoms. (? Fall.), as a synonym.

21. NEMATUS LATIVENTRIS.

Pl. XVII, fig. 4, Saw.

Nematus lativentris, Thoms., Hymen. Scand., i, 99, 23; André, Species, i, 145, 41 (*excl. syn.*).

Black, short, thick; antennæ as long as the abdomen; mandibles piceous. Legs black, the apical third of anterior femora, the knees of posterior, the tibiæ and tarsi, dirty testaceous; anterior tarsi marked with fuscous; apex of posterior tibiæ and tarsi black; spurs one-third of the length of metatarsus. Tegulæ piceous-yellow; edge of pronotum dirty testaceous. Wings hyaline, costa and stigma yellowish-white. Abdomen short and thick, apex of last segment dirty brown; cerci long, sheath hairy, projecting.

Length 2¾ lines.

Distinguished from *N. astutus* by its short, oblong *Selandria*-like body, which is shorter than the wings; black labrum, no ridge on scutellum, and the furrow on middle lobe of mesonotum is scarcely distinguishable; the spurs are shorter and metatarsus longer. The testaceous colour on the pronotum is better marked than in *astutus*, but according to Thomson this is a point in which *lativentris* varies, the pronotum and tegulæ being even quite black. Compared with *pallipes* the third cubital cellule is narrower at the apex.

Thomson describes the ♂ as having the abdomen glabrous at the apex, where there is a small narrow fovea on the back of the eighth segment, the anus being black or pale reddish.

Taken in Braemar by Dr. White. Sweden and Germany are the only other recorded localities.

22. NEMATUS LEUCOPODIUS.

Nematus leucopodius, Htg., Blattw., 200; André, Species, i, 132; Cat., 15*; Br. and Zad., Schr. Ges. König., xxiv, 143, 125.

Black, tegulæ, collar at base, and legs, clear white, the coxæ at base, apex of posterior coxæ and posterior tarsi black, sometimes the base of the latter and the hind knees are brownish, labrum and clypeus white. Antennæ longer than the abdomen in ♀, nearly as long as the body in ♂; in the latter the joints are compressed, and taper very perceptibly towards the apex. Wings clear hyaline, costa and stigma pallid fuscous. The ventral surface is more or less brown, especially at the junction of the segments. Head slightly punctured, frontal area and sutures obsolete; clypeus truncated.

Length 3 lines.

In general coloration *N. leucopodius* comes nearest to *N. appendiculatus*, but it is a larger species; the antennæ are quite black and shorter, and the legs are pure white throughout.

"Britain, J. F. Stephens," Kirby, List of Hymen., i, p. 117. Unknown to me.

Continental distribution: Germany.

V. THE GROUP OF PARVICORNIS.

Black, labrum, edge of pronotum, tegulæ, and most of the legs whitish-testaceous; stigma fuscous. Antennæ stout, not much longer than thorax, the third and fourth *joints equal. Front smooth, its sutures obsolete; clypeus transverse; pleuræ and breast smooth, shining; thorax covered with dense silky pubescence.*

From the preceding section the present is known by the smooth front and breast, by the short, thick antennæ, and by the thorax being covered by soft silky pubescence. The antennæ are shorter in both sexes than in any other British species of *Nematus.*

23. NEMATUS PARVICORNIS.

Nematus brevicornis, Thoms., Opus., 622, 18; Hym., Scand., i, 100, 25; André, Species, i, 169, Cat., 19,* 103 (*non* Foer.).
— *parvicornis*, Kirby, List of Hymen., i, 118, 116.

Black, smooth, shining; head (especially) and thorax covered with close silky pubescence; apex of clypeus, labrum, tegulæ, pronotum, base of costa, legs, and apical half of abdomen beneath, with the anal parts whitish-testaceous. Base of coxæ, a splash on the underside of posterior femora, with apex of posterior tibiæ and tarsi, black. Antennæ shorter than body, thick, compressed at base, tapering towards the apex, the third joint of the same size as fourth, curved beneath, and not longer than the longitudinal diameter of eye. Wings hyaline, the greater part of costa and stigma fuscous; third cubital cellule double so long as broad; basal nerve almost joined to costal. The eyes are large, oval, the clypeus small, truncated at apex; palpi long, white; mandibles piceous.

The ♀ according to Thomson is similarly coloured to the ♂ as described above, the apex of abdomen and belly being dirty-testaceous.

Length 2¼ lines.

I bred this species from larvæ found on birch in Sutherlandshire in June. The larva had a black head, and a yellowish-green body marked with orange spots and minute black points. The flies appeared in July.

Sutherlandshire.

Continental distribution: Sweden.

VI. THE GROUP OF CRASSUS.

Body entirely black, legs red save the base, hind tarsi and apical half of tibiæ, which are thickened and *grooved. Stigma black, costa testaceous, clypeus incised, sutures distinct, thorax covered with close longish pubescence, finely punctured on mesonotum and pleuræ. Antennæ long and filiform. Length from* 5 *lines.*

The large size of the two species composing this group easily separates them from the other black-bodied species with red legs.

1 (2)	Coxæ, trochanters, and spurs black.	*Crassus.*
2 (1)	Coxæ, base of trochanters, and spurs red.	*Cæruleocarpus*

24. Nematus crassus.

Pl. XVII, fig. 6, Saw.

Tenthredo crassa, Fall., Acta Holm., 1808, 106, 41.
Nematus sulcipes, Hart., Blatt., 186, 6; Evers., Bull. Mosc., xx, 14, 3; André, Species, i, 114; Cat., 14*, 24.
— *crassus*, Thoms., Opus., 629, 33; Hym. Scand., i, 123; Cam., Proc. Nat. Hist. Soc. Glas., ii, 312; Fauna, 36, 31; André, Species, i, 113; Cat., 14,* 22.

Antennæ black, nearly as long as the body, tapering towards the apex, the third joint curved, scarcely longer than the fourth. Head black, shining, slightly punctured, frontal foveæ broad, distinct; antennal rather deep; clypeus incised; the apex of labrum and mandibles at the apex reddish; palpi testaceous. Thorax black, shining, punctured, covered with short black pile; the pleuræ are densely pilose and opaque; the scutellum raised, opaque, and punctured; the cenchri large, clear white. Abdomen black, shining, a little narrowed at the apex; sheath of saw hairy and projecting, the cerci are short and black. Legs red; the coxæ, trochanters, and apical half of posterior tibiæ, with the spurs and the whole of the posterior tarsi, black; the four anterior spurs are reddish. The posterior tibiæ are thickened at the apex, pilose, and deeply grooved inwardly; the inner spur is double the length of the outer, and is nearly half the length of the metatarsus. Wings yellowish hyaline, iridescent, costa reddish-testaceous; the stigma black; the first transverse cubital nervure is absent, and the second recurrent nervure is received considerably in front of second transverse cubital. The tegulæ are black.

The ♂ is similarly coloured; the antennæ are longer, and the body is, if anything, more pilose.

Length 4½—5 lines.

This is apparently a northern form in Britain, and has only been met with at Braemar and at Kingussie, where I found it in June on aspens.

On the Continent it has been so much mixed up with the next species that it is difficult to give its distribution with certainty. According to Thomson it is spread over Sweden, is found in Germany and France, and Eversmann records it from the province of Casan.

Nothing definite is known regarding its early history, but it seems probable that it is attached to the aspen.

25. NEMATUS CÆRULEOCARPUS.

Vol. I, Pl. VII, fig. 6, Larva; Vol. II, Pl. II, fig. 7, ♀; Pl. XVII, fig. 5, Saw.

Nematus cæruleocarpus, Hart., 187, 8; Voll., Tijd. Ent., i, 148, pl. 6; Zool., s.s. 7526 (lar.); Kalt., Pfl., 558 and 578; Cam., Proc. Nat. Hist. Glas., ii, 312; André, Species, i, 113; Cat., 14,*21.
— *propinquus*, Dbm., Clavis, 25, 24 (lar.).
— *vicinus*, Lep., Mon., 197, 66; Ste., Ill., vii, 38.
— *brachyacanthus*, Thoms., Opus., 629, 34; Hym., Scand., i, 123, 50.
— *brevispinis*, Foer., Verh. Ver. Rheinl., xi, 338.
— *gelidus*, Kirby, List of Hym., i, 115, pl. vii, f. 10.

Black, shining, densely covered with fuscous pile. Legs red, coxæ at the base, and apical half of posterior tibiæ and the posterior tarsi black; spurs short, reddish. Wings hyaline, costa fuscous, stigma black. ♀ and ♂.

Length 3¾—4¼ lines.

Ab.—*a.* Abdomen reddish underneath.

Cæruleocarpus is distinguished from *crassus* by its smaller size, by the longer and thicker pile on the pleura and mesonotum, the reddish apex of the coxæ and the trochanters, the short reddish posterior spurs, which are scarcely one-third the length of the metatarsus; the wings are clearer and the posterior tibiæ have not so much of their apices black.

The larva has the head pale brown, with two dark stripes on the sides, meeting at right angles on the vertex. The legs are greenish-yellow with brown claws. The body is bluish-green, irregularly covered with black dots, each ending in a hair; along the sides there is a row forming a distinct, though slightly interrupted, line ending on the twelfth segment; the anal cerci are dark brown. The food canal shines through the skin as a dark stripe. At the last moult the skin assumes a darker green colour. It is found in the autumn.

When young it eats holes in the leaves of poplars and willows; when more mature it feeds along the edge, with the body curved to the shape of the part it has eaten out. It spins a large, double, dark brown cocoon in the earth, in which it pupates in April, or the beginning of May, the imagos appearing in May and June.

The pupa is glassy green, with the limbs paler and the eyes black.

Through these two species having been confounded a good deal of confusion has arisen regarding their synonyms. After the description of Fallén the next earliest is that of St. Fargeau, who described one of the forms under the name of *vicinus*, but whether it refers to *cæruleocarpus* or to *crassus* cannot now be decided, as he does not mention those points by which the two are separated. The same remark might almost be said of Hartig's description of *cæruleocarpus*, yet as he says that the coxæ are only black at the base, and that the apex only of the hinder tibiæ is black, while in *sulcipes* the tibiæ are only red at the base, and, again, as he states also that it is half a line shorter than *sulcipes*, there can I think be no doubt that *cæruleocarpus* is the same as *brachyacanthus*, which name, therefore, should not be adopted. Furthermore, it is certain that it is *brachyacanthus* which Van Vollenhoven has described under the Hartigian name. Zaddach treats both forms as mere varieties of one species, adopting the name of *crassus* (Schr. Ges. König., p. 353, 16) on the ground that the points of distinction between them are not of specific value, treating especially the length of the spurs as a variable character not to be depended upon. Taking, however, into account that there is also a difference in the form of the saw, and that as yet the larger form has not been bred, I do not feel inclined to unite them.

Cæruleocarpus I have never taken in Scotland, but it seems to be tolerably common in England. Worcester.

On the Continent it is found in Sweden, Holland, the Harz Mountains, and in France.

A variety (*palliditarsis*, Cam.) with the hinder legs quite pale, the stigma testaceous, and the body more densely pilose, has been taken in Spitzbergen by the Rev. A. E. Eaton (Proc. Nat. Hist. Glas., ii, 313).

VII. THE GROUP OF LUCIDUS.

Pronotum and base of abdomen reddish. Abdomen long, narrowing considerably from fifth segment towards the apex, cerci long. Head with a deep depression behind the ocelli, so that there seems to be a ridge round the back of the head, which is narrowed in the centre. Front largely projecting, antennal fovea very deep and conspicuous, and open above, thus V. *Pentagonal area distinct, clypeus slightly and roundly incised; antennæ long, filiform, the joints truncated and produced at the apex beneath, the third and fourth joints equal in* ♀, *the third shorter than fourth in* ♂, *which has the antennæ densely pilose. Wings with the second cubital cellule long, the third small, not much longer than broad. Hind tibiæ thickened and grooved; metatarsus thickened. Breast opaque, punctured.*

The red colour on the body enables this species to be distinguished from the other *Nemati* except those of the *Erichsoni*-group, and these again differ from it in the coloration of the legs. In general structure it comes nearest to *crassus* and *rufescens*.

26. NEMATUS LUCIDUS.

Pl. I, fig. 1, ♀, 1*a*, Antenna; Pl. IX, fig. 2, lar.;
Pl. XVIII, fig. 1, Saw.

Tenthredo lucida, Pz., F. G., lxxx, ii, f. 10.
— *crassa*, Fallén Acta, 1808, 106, 41, var. *β*.

Nematus lucidus, Olivier, Ency. Méth., 167, 5; Lep., Mon., 66, 109; Ste., Ill., vii, 37, 43; Hart., Blattw., 187, 7; Costa, F. N., 14, 63, 6; Thoms., Opus., 630, 36; Hym. Scand., 126, 52; Br. and Zad., Schr. Ges. König., xvi, 63, pl. 7, f. 1 (lar.); Cam., Fauna, 30, 3; André, Species, 104, 11, Cat., 13.*

Nematus cinctus, Lep., Mon., 66, 198; F. Fr., 68, 19, pl. 11, f. 2; Ste., l. c., 37, 44.

Antennæ nearly as long as the thorax and abdomen, black, the third, fourth, and fifth joints almost equal in length, the remaining gradually becoming shorter. Head black, strongly punctured on the vertex; the labium and palpi brownish-red. Thorax black, pronotum bright brownish-red, covered with short close pubescence; the cenchri pale; tegulæ reddish; pleuræ semi-opaque, punctured, the breast smooth and shining. Abdomen black, very finely punctured, the second, third, and fourth segments red at the sides and above, except a few small black dots in the middle. Legs reddish, the coxæ and apex of posterior tibiæ and the tarsi black; the posterior tibiæ are slightly thickened at the apex. Wings hyaline, iridescent; costa fuscous, stigma black.

The ♂ similar in coloration; the antennæ are longer and densely pilose.

Length 6—8½ lines.

The red on the abdomen varies in extent in both sexes, and may be entirely absent, or nearly so, in the ♂.

The larva is deep green, usually darker in tint on the back. Head dark brown, darker on the vertex and at oral region; spiracles dark brown, inclining to red; through them runs a white line. Over the legs is an irregular, longish, brownish-black or black mark. Above each of the first five ventral legs is an irregular black mark placed immediately below the spiracular white line; over the projecting fleshy part above the legs are a number of minute black tubercles, each ending in a little black bristle; there are two rows of these. On the thorax, a little in front of the two posterior thoracic legs, are some small hairs, and there are two rows of widely separated soft short hairs along the back. The claws bear short black hairs; cerci short, stumpy, broadest at apex, brownish to black in colour.

Brischke figures the larva with seven abdominal black marks, and with one over each leg. I have not seen any larvæ with that number.

It feeds in company on the edges of the leaves of *Cratægus oxyacantha*, stretching and jerking the body if alarmed. It is found in June and July. The cocoon is single, elliptical, and is spun in the ground. There is only one brood.

The imago appears in May and June. In Scotland it is not common, but seems to be tolerably abundant in the South of England.

Touch Hills, Stirling, Clydesdale, Worcester, Glanville's Wootton, Devonshire, Darenth Wood.

Sweden (not common), Prussia (very rare), Harz, Austria, Holland, Switzerland, France, Italy.

VIII. THE GROUP OF HYPERBOREUS.

Black. Mouth, anus, tibiæ, and tarsi white, or sordid white, costa and stigma white. Antennæ a little longer than half the body, clypeus incised, cerci long, spurs short, claws bifid. Head roughly punctured, mesonotum and pleuræ covered with fine scattered punctures; body covered with longish hair.

The first two species of this group are readily known by the long dense fuscous hair with which they are covered; the third species has the pubescence much shorter, but otherwise agrees closely. They may be known from the *pallipes*-group (which they resemble in coloration) by their much less coarsely punctured thorax, and emarginate clypeus.

Synopsis of Species.

1 (4) **Head and thorax covered with longish pubescence.**
2 (3) **Tegulæ and edge of pronotum white; hinder tarsi dirty white.** ***Thomsoni.***
3 (2) **Tegulæ and edge of pronotum black; hinder tarsi and apex of tibiæ black.** ***Clibrichensis.***
4 (1) **Head and thorax covered with short pubescence.** ***Apicalis.***

27. NEMATUS THOMSONI.

Pl. XVIII, fig. 2, Saw.

Nematus Thomsoni, Cam., Trans. Ent. Soc., 1882, 540.
— *hyperboreus*, Cam., Fauna, 32, *non* Thoms.

Black. Labrum, anus, tegulæ and edge of pronotum, legs, costa and stigma white; anterior femora largely, posterior nearly all, black. Antennæ a little longer than half the body, setaceous, the third and fourth joints equal, the rest shorter. Head a little narrower than the thorax, slightly rounded inwardly behind, black, shining, covered with longish pubescence; labrum dull white, palpi dark fuscous, front and vertex slightly rugose, sutures and foveæ not deep, pentagonal area invisible. Thorax shining, smooth, covered with longish scattered greyish pubescence; the posterior edge of pronotum and tegulæ white, cenchri large, white. Abdomen oblong, broad, truncated at apex, black, smooth, shining, very minutely punctured; anal segment sordid white; the cerci long, white, pointing towards each other. Sheath black, hairy, slightly exserted. Legs sordid white, the coxæ at the base, about one-third of the anterior femora, posterior almost wholly, anterior tarsi at apex, the posterior entirely, and the apex of the posterior tibiæ, black; the spurs are short. Wings hyaline, the costa and stigma white, nervures blackish; the third cubital cellule is double the width of the base at the apex.

Length 3¾ lines.

Easily known by its broad, short, black, shining, longly pilose body, with the anal segment broadly white, villose pleuræ, shortish antennæ, and dirty white legs with black posterior femora.

It is closely related to *N. villosus*, Thoms. (Hym. Scand. i, 127, 53), but that species is larger, the pleuræ not alutaceous, the tegulæ black, the abdomen black at the apex and the legs yellowish, black at the base. *N. hyperboreus*, Thoms., differs from it in having the pronotum entirely black, the thorax "supra subtilius sed crebrius punctato," &c.

N. Thomsoni is very rare in Britain, only two specimens having been hitherto discovered. These were taken by Dr. Sharp in Braemar.

28. NEMATUS CLIBRICHENSIS.

Nematus clibrichensis, Cam., Fauna, 32, 13 (1878); André, Species, i, 138; Cat., 19,* 110.

♂. Antennæ black, as long as the body, almost bare of pubescence, slightly flattened, each joint drawn out to a truncated, bead-like point at the apex, which is thicker than the base of the succeeding joint; the fourth joint is distinctly longer than the third, the rest become gradually shorter and thinner. Head black, sparsely covered with longish black hair; the vertex finely punctured, frontal area distinct; palpi black. Thorax smooth, shining, sparsely covered with long black hair; pleuræ scarcely so shining as the mesonotum, punctured, and covered with long black hair; the cenchri are very pale white. Abdomen slightly punctured at the base, the last segment and the gaping anal lobes sordid testaceous. Legs black, the coxæ and base of tibiæ sordid testaceous, the posterior tibiæ totally black; the four anterior tarsi are longer than the tibiæ, the posterior are also longer, but not so long in proportion as the anterior; the spurs are very short. Wings hyaline, nervures black, the costa and stigma sordid white; the first cubital cell is small, its nervure very pale; the second cellule is almost double the length of the third, and forms a very sharp angle where it receives the first recurrent nervure; the third is a very little widened at the base. The tegulæ are black.

Length a little more than 3 lines.

At the first examination I took this to be the undescribed male of *N. Thomsoni*, but a closer comparison showed so many points of distinction as scarcely to warrant such a conclusion; *e.g.* the pubescence is shorter, blacker, and thinner; the tegulæ are quite black; the legs much darker coloured; the costa and stigma are not so clearly white; the vertex has the puncturing more rugged, and the labrum is quite black.

I captured one specimen on the top of Ben Clibrich, Sutherlandshire (3180 feet high) in June.

Obs.—This may possibly be the ♂ of *hyperboreus*, Thoms., the ♀ of which is stated to have the labrum, stigma, costa, and anus dirty white, the anterior tibiæ and tarsi white, and the posterior and apex of tibiæ black. If it really be the ♂ it would thus differ from the ♀ in having the labrum and tegulæ black, the stigma yellowish-white, and the legs very much darker.

29. Nematus apicalis.

Pl. XVIII, fig. 3, Saw.

Nematus apicalis, Htg., Blattw., 201; Cam., Fauna, 31, 7; André, Species, i, 137, Cat., 19,* 119.

Black, covered (especially on head, sides of thorax, breast and abdomen) with moderately long fuscous pubescence; mouth, tegulæ, apex of femora, tibiæ and tarsi and apical abdominal segment white, or sordid white, apex of hinder tibiæ and tarsi black, the four anterior tarsi more or less fuscous. Wings hyaline, costa and stigma white, nervures fuscous, paler at the apex of the wings. Antennæ as long as abdomen and half the thorax, covered with close pile, the third joint much shorter than fourth; vertex and front coarsely punctured, frontal area sub-distinct; clypeus roundly incised. The third cubital cellule is about one-fourth longer than broad, slightly dilated at the apex; second recurrent nervure interstitial; recurrent nervures in hind wings interstitial. The spurs are short, scarcely one-third of the length of metatarsus; the tarsi are shorter than the tibiæ.

Length 3½ lines.

In coloration this species is almost identical with *Thomsoni*, but it is narrower, the pubescence is much shorter, especially on the mesonotum; the pronotum is entirely black, the tegulæ are fuscous-white; the antennæ are longer, cenchri smaller; the abdomen is more narrowed towards the apex, and is not so much truncated. *Apicalis* has considerable affinity with the *Capreæ*-group, but is readily separated from any of the species by the almost totally black body.

Rare. Clydesdale, Germany.

IX. The Group of Placidus.

Body short, broad, black, more or less reddish-yellow on head, thorax, and on underside of abdomen. Antennæ long, filiform, reddish beneath. Wings hyaline, stigma yellow, or pale testaceous. Clypeus broadly, but not deeply, incised, or almost transverse.

The species of this group is not unlike *N. mollis*, but it wants the strongly punctured thorax, while the antennæ are longer, thinner, and brownish on the underside.

30. NEMATUS PLACIDUS.

Pl. XIX, fig. 5, Saw.

Nematus placidus, Cam., E. M. M., xiv, 225; André, Species, i, 147; Cat., 19,* 107.

Antennæ nearly as long as the body, thin, filiform, the third joint a very little longer than the fourth, the rest a little shorter; black-brown from the second joint on the under surface. Head narrower than the mesothorax, black, the labrum and palpi white; clypeus almost truncated, piceous at the apex; vertex punctured, the pentagonal area and sutures indistinct; antennal fovea large. Thorax black, semi-shining, the mesonotum with a few punctures; tegulæ and pronotum (largely) white; pleuræ for the greater part brownish, shining. Wings clear hyaline, costa and stigma white; the first transverse cubital nervure is distinct, the third cubital cellule is a little longer than broad; the second recurrent nervure is received considerably in front of the second transverse cubital; there is a small horny point in the second cellule. Legs clear white, the apex of posterior tibiæ and tarsi (except at the extreme base) fuscous. Abdomen as long as the head and thorax, thickish, bluntly rounded at the apex; black, the anal segment pale brownish-white above; cerci pale, long, pointing downwards. The saw does not project.

Length 2¼ lines.

The antennæ are somewhat stouter than in *N. arcticus*, from which it is distinguished by the white, not yellow, colour of the pronotum and legs.

Rare. England (Rev. T. A. Marshall).

X. THE GROUP OF HISTRIO.

Ground colour obscure yellow, or fulvous. Thorax and abdomen more or less marked with black, mouth white, clypeus narrowly incised. Antennæ not much more than half the length of the body, the joints cylindrical, entirely black. Mesopleuræ finely punctured, pubescent, as is also the breast. Stigma pallid or livid fuscous.

This group has great resemblance to *capreæ*, but the ground colour of the thorax has a darker reddish tinge, the stigma is more livid, the body longer, antennæ shorter, stouter. In having black markings on the thorax in most of the species, and in all of them being very variable, both groups agree. The elongated abdomen of *histrio* and *glenelgensis* gives a different facies to them compared to *capreæ*, and the abdomen also is not broadly black along the back, but only at the base, or slightly marked with black along the middle. *Hæmorrhoidalis*, however, has pretty much the same body-form as *capreæ*, and it has the belly greenish-white when fresh, but acquires a brownish tinge with age. The two groups, in fact, might be united.

The males have either the body entirely black except the ventral surface, as in *glenelgensis* and *hæmorrhoidalis*, or the abdomen is fulvous in the middle as in *histrio*.

Synopsis of Species.

1 (2) Body for the greater part black, abdominal segments at the apex lined with livid white, stigma fuscous. *Humeralis.*
2 (1) Body for the greater part reddish-yellow, stigma livid white.
3 (4) Abdomen for the greater part black above, thickish, bulging out in the middle. *Longiserra, hæmorrhoidalis.*
4 (3) Abdomen longish, contracted and narrowed towards the apex, black at base and apex.
5 (6) Colour light reddish-yellow, legs for the greater part testaceous. Length 4¾ lines. *Histrio.*
6 (5) Colour dark reddish-brown, legs for the greater part black. Length 3¼ lines. *Glenelgensis.*

31. NEMATUS HISTRIO.

Pl. II, fig. 6, ♀ ; Pl. XVIII, fig. 4, Saw.

Nematus histrio, Lep., F. Fr., 65, 7; Mon., 63, 185; Br. and Zad., Schr. Ges. König., xvi, 68, 15, pl. 4, fig. 10; Cam., E. M. M., xi, 65; Fauna, 30, 4; André, Species, i, 105, Cat., 13,* 11.

— *rufescens*, Htg., Blattw., 191, 15; Ratz., Forstins., iii, 126; Thoms., Hym. Scand., i, 130, 56.

Tenthredo capreæ, var. *a* and var. *c*, Zett., I. L., 352, 52.
Nematus capreæ, Thoms., vars. *f*, *g*, *h*, Opusc., 631, 38.
— *striatus*, Brischke, Beschr., 12, pl. 11, f. 6 (lar.).

Antennæ much shorter than the abdomen, black, bare, almost shining, attenuated at the apex, the third joint almost shorter than the fourth. Head covered with very short pile, reddish, the part surrounding the ocelli and the mandibles black; mouth pallid, shining, punctured, the clypeus slightly emarginated; labrum nearly quadrate; antennal fovea small, round, deep; head turned inwardly behind, the front projecting; vertical sutures very distinct; eyes small, oval; the palpi fuscous. Pronotum livid testaceous, mesonotum half shining, punctured, reddish, with three black marks; the apical half of the scutellum and the metanotum being also black. The breast is smooth, and covered with white pubescence. The legs are reddish, the four anterior femora at the base and the posterior broadly lined with black, as are also the apical three-fourths of the posterior tibiæ and the whole of the posterior tarsi; the calcaria are short. Wings hyaline, nervures black, costa and stigma reddish-fuscous; the second cubital cellule is nearly double the length of the third. The abdomen is longer than the head and thorax, considerably narrowed towards the apex, reddish, the base, two or three spots on the apical segments, the cerci and apex of sheath, black; the cerci are very long, the sheath long, broad, and rounded at the apex, hairy, the apical segments of abdomen being likewise pilose; the blotch is pale yellow.

The ♂ has the antennæ slightly thicker than in the ♀: the abdomen is black, broadly red in the middle, thorax quite black.

Length 4¾ lines.

One of our largest species of *Nematus*. It is easily known by its reddish colour with the black marks on the thorax and abdomen, black posterior tibiæ and tarsi, elongated abdomen marked at base and apex with black, longish cerci and saws, and the shortish, deep black, bare antennæ.

It varies considerably in colour, more especially in the amount of black on the thorax, abdomen, and legs. The reddish ground colour also varies; in some specimens it is pale reddish-yellow, in others deep rufous, while occasionally examples occur of a very obscure brown, almost black.

Ab.—*a*. All the abdominal segments marked with black.

Larva shining, pale green, often with a slight bluish tinge, the skin (except at the thoracic and anal segments) with small black dots. On the back is a darker green dorsal stripe enclosed between two lines which, when the larva is feeding, are white. The head is of a paler green than the body and bears a few fuscous dots; the mouth is brown. The legs are glassy green with brown claws. When full fed it becomes of a uniform green colour. The pupa is pale green.

It feeds in June on *Salix alba* and on *Salix fragilis*, and the deep brown longish cocoon is spun under holes in the bark.

Brischke (l. c.) states that the larvæ feed also on the aspen, and that they gnaw long passages in the willow bark and hollow branches, out of which they seldom creep forth, and in which the cocoon is spun.

Histrio is widely distributed, but does not appear to be common. I have seen specimens from Clydesdale, Berwickshire, and Worcester.

It is met with in Lapland, Scandinavia, Germany, Russia (Curland), Holland, Switzerland, and France.

32. NEMATUS GLENELGENSIS.

Pl. XVIII, fig. 5, Saw.

Nematus glenelgensis, Cam., Trans. Ent. Soc., 1882, 535.

Dark brownish-red, the antennæ, the space surrounding the ocelli, breast, a mark on middle lobe of mesonotum, the greater part of the lateral lobes, apex of scutellum, metanotum, base of abdomen, and a broad transverse mark on the four apical segments, cerci and sheath deep black. Labrum and clypeus dirty white. Legs pallid testaceous; coxæ at base, the basal fourth of anterior femora, basal half of middle, and the whole of posterior pair lined above and beneath with black; all the tarsi, apex of anterior tibiæ, apical half of middle, and the whole of posterior pair, black. Wings hyaline, with a very slight griseous tinge; costa and stigma fusco-testaceous, the latter much clearer in the middle.

Length 3¼ lines.

I believe this is a distinct species from *N. histrio*, although it must be confessed that the two are very closely allied. It is smaller by a line than the ordinary form of *histrio*, the ground colour is very much darker, the legs especially being almost entirely black; the antennæ are longer and thinner, and taper more towards the apex, and the saw differs, its apical division being bent in the middle, while with *histrio* it is straight.

I bred it from larvæ which I found feeding on *Salix aurita* at Glenelg, Inverness-shire. These larvæ would appear to agree perfectly with the figures and descriptions given by Brischke and Zaddach of those of *histrio*. The head was light green, mottled on the top with a darker green; mouth dark brown. Legs light green with brown claws. Body dark green, the segmental divisions are marked with white lines. Down the back runs a dark green line, bordered on either side by a white, narrower one. On the side runs another white line. All the lines end on the second last segment which, with the last, is of a lighter green colour and bears a broad white mark on the top. The skin is beset with numerous little black points.

Among this batch of larvæ were one or two which had the body of a darker green, and the segmental divisions were not marked by white lines. On the back were two black lines formed of small, distinct, but closely continuous black dots. There was also an irregular waved line of dots over the forelegs. The only specimens of the larvæ of *histrio* I have met were found in their cocoons under the bark of *Salix alba*, and I have no description of the feeding larvæ, so that I am not in a position to say if these differed much from those I have described, but I think it will be found that the true *histrio* is attached to *S. alba.*

A specimen of *glenelgensis* sent to the late Prof. Zaddach was returned as a variety of *histrio.*

33. NEMATUS LONGISERRA.

Pl. XIX, fig. 1, Saw.

***Nematus longiserra*, Thoms.,** **Opus., 632, 39; Hym. Scand., i, 128, 55; Br. and Zad., Schr. Ges. Königs., xvi, 68; ? Cam., E. M. M., xiii, 177; Fauna, 30, 5; André, Species, i, 186; Cat., 13,* 12.**

Dark fulvous, covered with faint white down, the mouth white, the antennæ, three broad marks on the mesonotum, the sternum, and the dorsum of abdomen (except the extreme apex), black. The antennæ are shorter than the abdomen, the apical joints thin, the third and fourth equal in length; the clypeus is not notched. Mesonotum shining, strongly punctured. Sheath large, long, broad, black, largely projecting; the cerci long, fuscous, pubescent at the apex, and as long as the half of the abdomen. Abdomen more than a fourth longer than the head and thorax, the apical segments project in the middle into a thin half-circular plate. Legs pale obscure yellow, with the posterior tarsi fuscous. The posterior tarsi are shorter than the tibiæ, and the femora than the tibiæ; second tarsal joint is a little shorter than the fifth. The femora have a short black line at the base. Wings hyaline, the costa and stigma pale white, the latter being a little darker at the apex.

The ♂ is black with the exception of the mouth, orbits, pronotum, tegulæ, belly and legs, which are dark fulvous; the antennæ are nearly as long as the thorax and abdomen, and the anterior legs broadly lined with black at the base. The abdomen is keeled in the middle throughout, the keel produced at the apex, and with a large and deep fovea on either side of it.

Length scarcely 3 lines.

A smaller species than *N. histrio.* The ground colour is lighter than in that species, and the clypeus can scarcely be said to be notched.

I am not quite satisfied as to the above-described species being *N. longiserra* of Thomson, for its ovipositor does not seem to be quite so long, not being quite "dimidio abdomine haud breviore." In coloration my specimens belong to Thomson's var. *c.* Apart from the difference in the form of the saw it does not differ much from *N. hæmorrhoidalis;* the clypeus is not so deeply notched, however, and the ♂ has the antennæ longer, thinner, and not so pilose; it is narrower, the anterior femora only are lined with black, the abdomen is keeled and the stigma is darker. It is a smaller species than *histrio;* the ground colour is lighter, the clypeus almost transverse, the costa and stigma in the ♀ are lighter coloured and the legs are only black at the base.

Bred from among larvæ of *N. glenelgensis* (cf. p. 94).

34. NEMATUS HUMERALIS.

Pl. IV, fig. 4, ♀; Pl. XIX, fig. 2, Saw.

Tenthredo humeralis, Zett., Ins. Lap., 351, 48.
Nematus capreæ, var. *ε*. Thoms., Opus., 631, 38.
— *fallax*, var. *humeralis*, Br. and Z., Schr. Ges. König., xvi, 69.
— *humeralis*, Thoms., Hym. Sc., i, 132, 58.

Black, closely covered with longish white pubescence; clypeus, labrum, inner orbits, the edge of the pronotum, tegulæ, the edges of the apical abdominal segments, and almost the whole of the belly, livid white. Legs: coxæ, trochanters, base of femora, the knees, and tibiæ in front, livid white; the four anterior tibiæ black behind, the posterior fuscous, except at the base; tarsi black, the anterior pair fuscous. Wings large, clear hyaline; costa, stigma, and nervures, pale fuscous.

Length 4—4½ lines.

This is a larger and broader insect than *hæmorrhoidalis*, it wants entirely the red ground colour of the latter, the pubescence is closer, longer, and paler; the abdomen is more truncated at the apex, the femora are longer and narrower, and the stigma fuscous.

Rare. Worcester.

Continental distribution: Lapland, Sweden.

35. NEMATUS HÆMORRHOIDALIS.

Vol. I, Pl. IV, fig. 9,* Larva; Vol. II, Pl. I, fig. 10, Palpus, 10*a*, Labium; Pl. XVIII, fig. 6, Saw.

Tenthredo capreæ, Fall., Acta, 1808, 121, 64 (*nec* Pz.); Zett., I. L., 352, 52.
Nematus humeralis, Lep., Mon., 66, 195; F. Fr., 68, 16.
— *capreæ*, Thoms., Opusc., 631, 38.
— *fallax*, Lep., F. Fr., 66, 9; Mon., 64, 187; Br. and Zad., Schr. Ges. Königs., xvi, 69, pl. 5, f. 11, and pl. 6, f. 4 (lar.); Cam., Fauna, 30, 6; Ste., Ill., vii, 34 (the type is *capreæ*, Pz.); André, Species, i, 107; Cat., 13,* 14.
— *striatus*, Htg., Blattw., 191, 14; Thoms., Hym. Scand., i, 131, 57.
— *vittatus*, Lep., Mon., 64, 188; F. Fr., 66, 12; Ste., Ill., vii, 34 (his types are *miliaris*, Pz.).

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* Under the name of *N. fallax*.

Nematus hæmorrhoidalis, Spin., Ins. Lig., ii, 20; Lep., Mon., 65, 194; Ste., Ill., vii, 35 (his types are *capreæ*, Pz.).
— *variabilis*, Tischbein, Stett. Ent. Zeits., 1846, 80.
— *squalidus*, Evers., Bull. Mosc., xx, 21.
— *incanus*, Foerster, Verh. Ver. Rhein., xi, 302, pl. v. f. 18 (wing).

Reddish, elongate; the mesonotum and pleuræ semi-opaque, punctured, breast shining; the vertex, two marks on the mesonotum, metanotum, and abdomen on the back (apex excepted), black; the face, legs, abdomen beneath and at the apex above, livid white; the femora more or less lined with black; posterior tarsi black. The cerci are moderately long; sheath long, pilose, black at apex. Antennæ about the length of the abdomen, black, tapering slightly towards the apex. Wings hyaline, the costa and stigma livid white. The pronotum and tegulæ livid.

♂ black, mouth, tegulæ, a thin line on the pronotum and the apex of abdomen beneath, white, varying to fuscous.

Length 2¾—3¼ lines.

Easily known from the preceding species by the livid colour of the pronotum, tegulæ, legs, abdomen, and stigma. The sheath is only black at the extreme tip, and is not so broad; the clypeus is slightly emarginated, the calcaria short; the third antennal joint is nearly equal in length to the fourth, the second recurrent nervure is received considerably in front of the second transverse cubital; the fovea between the antennæ is very deep, vertex punctured, and the palpi pale white. When alive the ground colour of the abdomen, &c., is greenish.

I have only seen two aberrations.

Ab.—*a.* Mesonotum with three black marks, sometimes almost confluent; the metanotum, basal half of scutellum, sternum, a small mark on pleuræ, and occasionally a thin line on the femora, black.

b. As in *a*, but the black on the femora more distinct, and no black marks on pleuræ and breast.

The type varies a little in having the abdominal segments pale at their junction, and the three or four apical ones without any black. This is especially noticeable in bred specimens. The aberrations *a* and *b* occur together.

Larva. Head glassy green, dotted at the top with minute brownish dots, and there is on each side a longish brown mark in which are the eyes; another brown line is on the centre of the forehead; all these marks are frequently united, so that the head becomes of a brown colour, the mouth is deep brown. A few hairs are scattered over the surface of the head. Legs yellowish-green, the claws brown. The body is dark greyish, or whitish-green, with a faint white line along the sides, and marked also with some darker green spots.

When young the larva wants the white stripe, which likewise disappears when the creature is ready for pupating.

I find the larvæ early in July feeding on the leaf buds of *Salix repens*, and more rarely on *S. aurita* and *vitellina.* When the leaves reach maturity the larvæ feed along the edges. The cocoon is spun in the earth; it is single, elliptical, brown, and thin. According to the observations of Brischke the larvæ are found from June to September, but in Scotland I have never seen them after the end of July or beginning of August. There is but one generation in the year.

The only British localities I know of are Strath Carron Ross-shire, Possil Marsh near Glasgow, Worcester, Exeter (Parfitt), London district (Billups).

Also it is found in Lapland, Finland, Scandinavia, Germany, Russia, Holland, France, Switzerland, and the North of Italy.

XI. THE GROUP OF CAPREÆ.

The ground colour is dull yellowish or orange, the head has the vertex black; the mesonotum bears three more or less continuous black bands, the metanotum is generally black. The abdomen on the back is, as a rule, blackish to the apex, and the breast bears a large black mark. The antennæ are black, usually not much longer than the *abdomen; the wings have the stigma white or yellowish white, the costa of the same colour, clypeus incised. The head is usually narrowed considerably before and behind, but it may be thick and broad in front, it projects considerably before the eyes, the antennal space not clearly separated from the sides. In only one species* (canaliculatus) *is the thorax in any way punctured. The males have the antennæ as long as the body, hairy, and are darker as a rule than the females, the sides of thorax being always black.*

Synopsis of Species.

1 (6) **Breast smooth, shining, impunctate.**
2 (3) **Abdomen above for the greater part brownish-yellow, body for the greater part brownish-yellow.** ***Turgidus.***
3 (2) **Abdomen black above.**
4 (5) **Costa yellowish-white, front thick and broad, head not much narrowed before and behind; third joint of antennæ curved.** ***Capreæ.***
5 (4) **Costa and stigma clear white, head distinctly narrowed before and behind; third joint of antennæ straight.** ***Imperfectus.***
6 (1) **Breast and pleuræ finely granulated.** ***Canaliculatus.***

36. NEMATUS CAPREÆ.

Vol. I, Pl. III, fig. 2, Larva; Vol. II, Pl. IV, fig. 8, ♂; Pl. XIX, fig. 6, Saw.

***Tenthredo capreæ*, Panz., F. G., Heft 65, f. 8; Krit. Revis., ii, 46.**
***Nematus pallicercus*, Htg., Blattw., 190, 13.**
— *Kirbyi*, Dbm., Clavis, f. 4; Thoms., Opus., 626, 26 Hym. Scand., i, 115, 40.
— *clitellus*, Lep., Mon., 62, 183.
— *griseus*, Evers., Bull. Mosc., xx, 18, 18.
— *continuus*, Evers., l. c., 19, 20.
— *trisignatus*, Foerst., Verh. Ver. Rhein., xi, 292, pl. v, f. 11 (wing).
— *circumscriptus*, Foerst., l. c., 301, pl. v, f. 17 (wing).
— *cinereus*, Evers., Bull. Mosc., xx, 18.
— *capreæ*, Br. and Zad., Schr. Ges. König., xvi, 75, pl. 5, f. 8 and 9 (lar.); André, Species, i, 157, pl. v, f. 4; Cat., 13,* 15; Cam., Fauna, 31, 8.

Testaceous and yellow, the vertex, some marks on meso- and metanotum, pleuræ, sternum, and dorsum of abdomen black. Legs for the greater part pale testaceous. Wings hyaline, the costa and stigma white.

Antennæ thin, filiform, nearly as long as the thorax and abdomen, black, pilose, the joints well separated from each other, the third curved, shorter than the fourth, the others not much shorter than the third. Head a little narrower than the thorax, dilated considerably behind the eyes, closely covered with short erect hairs; the vertex thick, with its sutures very distinct, the front thick, projecting between the eyes, its fovea large and deep; the clypeus short, narrowed at the apex, where it is narrowly, but not very deeply, notched; the head is scarcely bent inwardly behind. Thorax smooth, shining, finely punctured; cenchri large, clear white. Abdomen short, thick, dilated, and semi-cylindrical, a little keeled in the middle above, bluntly rounded at the apex; the cerci are moderately long, and point downwards; the sheath projects, its apex black, pilose. Legs pilose, the calcaria short, the posterior tarsi shorter than the tibiæ, the second joint shorter than the fifth, the basal joint is thickened at the apex. Wings, with the first cubital cellule, small, the second nearly double the length of the third, dilated considerably where it receives the first recurrent nervure; the second recurrent nervure is received very near to the second transverse cubital, in most specimens almost joined to it.

The ♂ has the antennæ longer and more pilose, third joint curved; the head and thorax black.

Length 3—4 lines.

Ab.—*a.* Pale testaceous-yellow, a small spot on the vertex, three marks on the mesonotum, the sternum, a thin line below the wings, and the back of the abdomen (except at the apex and the junction of the segments) black. The femora at the base and the apical joints of the posterior tarsi black.

b. As in *a*, but the mark on the vertex larger, those on the mesonotum almost confluent, only a narrow stripe on the pleuræ yellow, and the back of the abdomen entirely black. The femora are broadly lined with black, and the apex of the posterior tibiæ and the tarsi are of the same colour. The commonest aberration.

c. As in *b*, but only a small yellow spot on the mesonotum, and the femora entirely black.

d. As in *c*, but with two yellow marks on the mesonotum, one being on the scutellum.

e. The thorax with only a small yellow spot on the pleuræ and a thin black line on the femora. This aberration was bred.

f. As in *c*, but with only a narrow yellow band over the eyes.

Male aberrations:

g. Entirely black except the anal parts; the tegulæ black, the knees, and the basal three fourths of the tibiæ pale white.

h. The legs pale luteous, black at the base, the three apical segments of abdomen and a dull yellow ring round the eyes luteous. The apical joints of the tarsi fuscous; the mouth and tegulæ black. The stigma luteous. This was bred along with the ♀ aberration *e*.

i. As in *h*, but tegulæ luteous, the mouth white; on the abdomen the anal parts only are yellow.

j. The labrum, knees, tibiæ, and tarsi whitish, the rest of the body black.

k. As in *i*, but the abdomen luteous except the two basal abdominal segments above.

This most variable species has a considerable resemblance to *hæmorrhoidalis*, but they are easily separated by noticing that the head in *capreæ* is considerably dilated behind the eyes, that the third joint of the antennæ is curved on the underside and is shorter than the fourth; the ground colour is different, it being a reddish testaceous yellow, and it shows none of the livid white colour so noticeable in *hæmorrhoidalis*, while the stigma is whiter.

In addition to the colour varieties enumerated above, it may further be pointed out that the position of the second recurrent nervure varies, it being sometimes placed almost in the middle of the second cubital cellule, while oftener it is almost joined to the second cubital nervure. The antennæ again are apparently longer and thinner in some females than in others, and the curvature in the third joint is scarcely apparent in some examples, although very well marked in most specimens. Many males, too, have the antennæ and pleuræ more pilose than in others. The size of the third cubital cellule is subject to variation; in a few

♂ individuals I have found it very small and almost square. There is no horny point in the second cellule. In the males as a rule the stigma is darker than in the other sex; occasionally, however, it is quite yellow.

Larva. The head is of the size of the second segment, the ground colour is yellowish-green or gray, the vertex covered with small brown dots; the eye spots are black, and there is a small dark stripe above them; there is a clear light green triangular space on the face; the mouth is brown. The body is cylindrical, rather thin, narrowed behind; the skin is beset with dots each of which ends in a hair; the colour is dark green to the spiracles where there is a narrow white line, below which the colour assumes a lighter tint. The dorsal vessel is observed as a thin black line, bordered on each side by a white one of the same breadth; these are not visible on the second and last segments. The junctions of the segments are marked by pale thin lines. Over the legs the skin is raised in folds like blisters. The hairs on anal segment do not proceed from raised points as do the others.

When full-fed the body becomes of a uniform green colour, the white lines having disappeared; the spiracles are then black, the head dark brown. A rather rare variety of the larva is of a crimson-red colour with the usual white lines, this variety being of this red colour before and after becoming full fed. When young the larvæ are dull brownish-green with pale yellow heads.

These larvæ feed on various species of *Carex*, but they will also eat grasses. Indeed, most of the specimens that I have reared were fed on *Poa annua* or any other grass that could be had conveniently. They are very lively creatures, and roll themselves up and drop at once to the ground if disturbed when feeding. They eat along the edges of the leaves. The oblong, thin brown cocoon is spun in the ground, or in confinement between the leaves. The pupa is glassy green with white antennæ, wings, and legs. There are, I believe, two broods in the year; one in early summer (June), the second in August. With regard to the red variety of the larvæ I may mention that they seem to be very delicate and difficult to rear compared to the common form.

This is one of our commonest and most widely distributed species. It appears to be commoner in the north than in the south.

Continental distribution: Lapland, Finland, Sweden, Russia to the Ural Mountains, Germany, Holland, France.

Obs.—Great confusion has existed as to what species should be regarded as *capreæ*. Linné's *capreæ* cannot be determined as the imago was not described, but only the larva. The next description is that by Panzer, whose *capreæ* is identified with that here described by his figure which is good enough. Fabricius apparently described a different species, yet he quotes Panzer's figure. The *capreæ* of the other old systematic writers need not trouble us. Of the modern authors Hartig's *capreæ* is *rumicis*, Fall., while sundry willow-feeding larvæ have been described by various writers under the name of *capreæ*. After the figure of Panzer, the next certain name is that of *Kirbyi* applied to it by Dahlbom. The name of *capreæ* is scarcely an appropriate one, yet as the oldest which can be fixed with certainty it must, in accordance with the law of priority, be adopted. The *capreæ* of Fallén and Zetterstedt is *fallax*, Lep. In Stephens' collection, *capreæ*, Pz., is represented under the name of *N. tæniatus* (in part), *hæmorrhoidalis*, *fallax*, and *affinis*.

37. NEMATUS TURGIDUS.

Pl. XX, fig. 1, Saw.

Nematus turgidus, Zaddach, Schr. Ges. König, xvi, 82.
— *pallicercus*, Thoms., Hym. Scand., i, 148, 79 (*nec* Htg.); André, Species, i, 197; Cat., 14,* 19.

Antennæ black, nearly as long as the thorax and abdomen, tapering towards the apex, slightly pilose, the third joint shorter than the fourth. Head narrower than the mesothorax, pale yellow, the mouth paler, covered with pale down; the frontal area distinct, the front itself projecting; the antennal furrows proceed round the base of the antennæ; clypeus a little emarginated in the middle, labrum projecting; the mandibles are black at the apex; the space surrounding the antennæ and around the ocelli black. Thorax smooth, shining, with a few shallow punctures and faint scattered down; pleuræ and breast smooth and shining. Mesonotum with three black spots of a variable size, sometimes wide apart, sometimes almost continuous; scutellum luteous, the metanotum also luteous, but sometimes marked with black. Breast black, and there is a black line below the wings; the post-sternum is also black; the cenchri are large, white. Abdomen a little longer than the head and thorax, cylindrical, tapering at the apex; the last segment thin, leaf-like, arching over the saw; luteous, sometimes marked with black transverse spots; the cerci are longish, thin, darkest at the apex, the sheath black; the saws very broad. Legs pale luteous, the coxæ faintly marked with black; the tibiæ whitish; apex of tarsi fuscous; the anterior tarsi are shorter than the tibiæ; calcari short. Wings almost hyaline, but with a faint smoky tinge; the costa and stigma pale yellow, nervures blackish, except at the base, where they are faintly yellowish. The first transverse cubital nervure is very faint; the second cellule is more than double the length of first, and angled where it receives the recurrent nervures; the second recurrent nervure is received a little in front of second transverse cubital.

Length 3½ lines.

This species is not difficult to separate from the other species of the group through the light reddish colour of the body and legs, the amount of black on it being very little. The abdomen and legs are sometimes without any black, while the thoracic marks as well as that on the vertex are often very small, and the mark on the breast is divided in the middle. With the darker coloured aberration the femora are lined with black at the base. The ♂ is unknown.

Brischke bred it from a larva which he found in the earth on June 28th preparing to pupate, having already moulted. It was smooth, wrinkled, with padded sidefolds, and of a uniform carmine-red colour, the eyes and mouth only being blackish-brown. The imago appeared on August 4th.

Turgidus seems to be rather rare. I have only seen two specimens taken at Glanville's Wootton by Mr. Dale, and two or three taken by myself in Clydesdale.

It is also rare in Prussia and Sweden.

Obs.—There can, I think, be no doubt that the *pallicercus* of Hartig is a variety of *capreæ;* and I think also that the *pallicercus* of Thomson is the present species, although his description does not agree in some slight particulars with the specimens I have seen, but considering how variable the species is these slight discrepancies can scarcely be regarded as of very great importance. The *pallicercus* of van Vollenhoven does not belong to the *capreæ* group. It is to be noted that Thomson places *pallicercus* between *N. miniatus*, Htg., and *N. croceus*, Fall., which is scarcely its natural position.

38. NEMATUS IMPERFECTUS.

Pl. I, fig. 3, ♀; Pl. XIX, fig. 3, Saw.

Nematus imperfectus, Zaddach, Schr. Ges. König., xvi, 80 (1875);
André, Species, i, 187; Cat.,
14,* 20.

Shining, covered with very short white pile; pale yellowish-white, the head and thorax rufescent, the vertex, sternum, three almost confluent marks on mesonotum, metanotum, and back of abdomen to the eighth segment, black; apex of posterior tibiæ and tarsi fuscous. Wings hyaline, costa and stigma clear white, the last with its outer border brown. Mesonotum and pleuræ faintly punctured. The sheath of saw blackish, shortly projecting, the cerci are pale, fuscous at the tip. Over each of the four anterior femora is a short thin black line.

Length 3—3½ lines.

This insect differs from *N. capreæ* in the pale yellow colour of the abdomen and legs and reddish thorax, as also in the clear white stigma, which is fuscous at the apex, this being never the case with those specimens of *capreæ* which have that part of the wing white. In the form of the head, and generally in its body form, it agrees with *N. canaliculatus*, but the colour is paler and more bleached, the antennæ apparently are longer in proportion to the size of the abdomen, the head is scarcely so rounded inwardly behind, the sides of the abdomen and belly are free from black markings, while the saw does not project so much, and is very different in form. Zaddach states that all his types had not the thorax punctured, while those which were not punctured varied otherwise from the specimens which I have described above.

In one of my specimens the abdomen is pale at the junction of the segments, and has all the femora lined above with black. The other two have only the four anterior so marked, and the black mark on the sternum is spotted with red. The ♂ is yet unknown.

I have taken a specimen of *imperfectus* near Glasgow, and other two on Craig Dhu, Kingussie, at an elevation of about 2000 feet, among ferns.

Zaddach had specimens from Finland, Germany, and Silesia, but only seven individuals in all.

39. NEMATUS CANALICULATUS.

Pl. XIX, fig. 4, Saw.

Nematus canaliculatus, Htg., Stett. Ent. Zeits., 1840, 23, No. 13; Br. and Zad., Schr. Ges. König., xvi, 79; André, Species, i, 157, Cat., 14,* 16.
— *stenogaster*, Foer., Verh. Ver. Rhein., xi, 339, pl. vi, f. 46 (wing).
— *pleuralis*, Thoms., Opus. Ent., 628, 32; Hym. Scand., i, 117, 41.

Antennæ as long as the abdomen, tapering considerably towards the tips, black, bare, the third joint shorter than the fourth. Head reddish testaceous, the vertex around the ocelli, and the part surrounding each antenna, black; the face whitish, apex of mandibles piceous, palpi pale testaceous; the vertex is finely punctured and covered with close white pile. Thorax reddish-testaceous, the pronotum and sides paler; mesonotum semi-opaque, very finely punctured, and with three distinctly separated black marks; the pleuræ distinctly granulated, semi-opaque; the sternum black and finely punctured; there is also a small black line on the sides below the wings; the metanotum is entirely black. Legs pale yellow, a short thin line over posterior femora, the apex of posterior tibiæ, and the tarsi, black; the claws are distinctly bifid. Wings hyaline, costa and stigma sordid luteous; the second recurrent nervure is received at some distance in front of the second transverse cubital; the second cubital cellule is a little more than one quarter longer than third. Abdomen cylindrical, longer than the head and thorax, finely punctured at the base, the dorsal surface black to the seventh segment, the sides and belly whitish-yellow, marked with black spots. The saw projects beyond the length of the cerci, black, bare, shining; the cerci longish, fuscous, pointing outwardly.

The ♂, according to Zaddach, is rare compared to the same sex of *capreæ*; it is very lightly coloured, the red ground colour on the vertex and mesonotum being visible; it has also the black spots on the mesonotum borne by the ♀, but they are larger, although not united, and there is also a black spot on the scutellum. The abdomen is black to the anal parts, the belly being, however, paler than the rest.

Length nearly 4¼ lines.

This species differs from *N. capreæ* in the granulated punctured pleuræ, less shining body, of which the ground colour is decidedly reddish, the pale yellow legs and sordid luteous stigma. The head also is broader in comparison to the length; it retreats more inwardly before and behind, the eyes project more, the face is longer and whitish-yellow, and altogether the head is not so globular and swollen. The legs are longer in proportion, and the femora have only a short thin line on their apical half, the anterior also being free from black.

Brischke (l. c. *supra*) bred *canaliculatus* along with *N. umbripennis*, Evers., from larvæ which fed on *Populus tremula*, and he concludes, therefore, that the larvæ of the two species are indistinguishable and of similar habits, *umbripennis* being, however, really a distinct species, easily distinguishable from *canaliculatus* by its shining unpunctured pleuræ and brownish-yellow wings. The larva of *umbripennis* is stated to be slender, narrowed posteriorly, of a clear bluish-green colour with shining head, black eye spots, and dark mouth. The dark dorsal canal is bordered on each side by a thin white line, and another very thin white line is on the sides at the spiracles. The segmental divisions are white. Sometimes the skin-folds over the legs bear two rows of fine black tubercles. At the last moult the larva becomes clear, shining, grass green. It is very desirable that a careful comparison and breeding of these larvæ be made, as it is quite possible there may be some slight though radical distinction between the two. If Brischke's observations be correct then we have here a converse case to that of *N. cadderensis* and *N. croceus*, where very different larvæ produce very similar imagos.

The only British specimen that I have seen of *canaliculatus* was taken by myself in June on birch at the Falls of the Shin, Sutherlandshire.

It does not appear to be very common on the Continent either. Zaddach mentions having seen specimens from Lapland, Prussia, Holstein, and

Nassau, while Thomson had only a single specimen from near Stockholm.

XII. THE GROUP OF LEUCOGASTER.

Body black, edge of pronotum, tegulæ, and belly white or lacteous. Wings with a pale costa, the stigma livid, fuscous, or white. Antennæ longish, black, third and fourth joints subequal. Front punctured, clypeus almost truncated or incised. Body smooth, shining. Legs whitish, the femora marked sometimes with black. Claws usually with a subapical tooth. The first transverse cubital nervure is absent or pellucid.

A group of small extent. The totally black mesonotum distinguishes it from Group XIII and from the preceding.

Synopsis of Species.

1 (6) Femora more or less black, clypeus almost truncate at apex.
2 (3) Hind femora broadly black. ***Conductus.***
3 (2) Hind femora black at apex only.
4 (5) Vertex raised, belly and sides of abdomen lacteous. ***Obductus.***
5 (4) Vertex flat, belly and sides of abdomen yellowish. ***Pallidiventris.***
6 (1) Femora without black, clypeus more or less incised at apex.
7 (10) Metapleura black, stigma livid.
8 (9) Clypeus black, costa paler than stigma. ***Leucogaster.***
9 (8) Clypeus white, costa not paler than stigma. ***Strongylogaster.***
10 (7) Metapleura white, stigma white. ***Pulchellus.***

40. NEMATUS PALLIDIVENTRIS.

Pl. II, fig. 1, ♀; Pl. XXII, fig. 4, Saw.

Tenthredo pallidiventris, **Fallén, Acta, 1808, 120, 63.**
Nematus **— Thoms., Opus., 110, 35; Hym. Sc., i, i, 110; André, Species, i, 191; Cat., 21,* 151; Cam., Fauna, 29, 2.**
— *flavicomus*, Tischbein, S. E. Z., 1846, 77; André, l. c., 199; Cat., 23,* 168; Br. and Zad., Schr. Ges. König., xx, 154, 136, pl. vii, fig. 7.

Black, smooth, shining, vertex strongly punctured; clypeus slightly arched; mandibles piceous at the tips; a spot between the antennæ, apex of clypeus and labrum, white; pronotum, tegulæ, and abdomen on the underside and at the sides, pale testaceous; on the dorsum is a row of transverse interrupted black lines; legs pale yellowish-white, the tibiæ and base of femora pale white; a dot on the apex of posterior femora, the apical third of posterior tibiæ, and the posterior tarsi, black. Wings hyaline, iridescent, slightly clouded in some specimens; the costa fuscous; the stigma fuscous-black. The first transverse cubital nervure is absent, and the second recurrent nervure is received considerably in front of second transverse cubital. The sheath of the saw is black and hairy, and projects considerably.

Length 2½—3 lines.

Ab.—*a.* Dorsum of abdomen entirely luteous.

b. Anterior femora lined with black at the base.

The coloration of the abdomen varies considerably; sometimes the dorsum is completely black, at other times entirely testaceous. It closely resembles *N. obductus*, but may be readily known from it by the vertex being quite flat, not raised in the centre as in the other species. The ♂ I have never seen, nor apparently has any one else.

The larva, according to Brischke, feeds on the raspberry and on *Geum urbanum.* It is green, wrinkled; the dorsal canal is of a darker green, and is bordered on either side by a white line. Each segment bears three rows of hairs. The last segment and the head are shortly haired. Eye spots black, mouth brown.

Not uncommon in May and June among herbage. Clydesdale, Gloucester.

On the Continent it has been recorded from Sweden Germany, and France.

Obs.—Zaddach (Schr. Ges. König., xxiv, p. 318) describes a *Nematus eurysternus*, of which he says he received a specimen from me from Scotland as *N. pallidiventris*, Fall., and which he states does not agree with the description given by Thomson of *pallidiventris*, especially in not having the vertex strongly punctured. I am certain, however, that the specimen referred to belongs to the present species. It is not stated distinctly that *eurysternus* has a smooth vertex, but judging from the remarks made about *pallidiventris* it looks as if it had. In other respects it does not appear to differ much from *N. pallidiventris*, except perhaps in the hind femora not having any black at the apex, but the specimen he received from me is stated to have a small black mark at the posterior knees. In *pallidiventris* this black spot is often very slight. Possibly *eurysternus* is only a variety of *pallidiventris*.

41. NEMATUS OBDUCTUS.

Pl. XX, fig. 3, Saw.

Nematus obductus, Htg., Blattw., 201, 32; Thomson, Opus., 626, 25; Hym. Scand., i, 114, 39; André, Species, 176, 236; Cat., 19,* 116; Cam., Fauna, 35, 25; Br. and Zad., Schr. Ges. König., xxiv, 152, 135.

Black, shining, forehead and mesonotum finely punctured, the mouth, edge of pronotum, tegulæ, legs and belly greenish-white when young, lacteous when old; apex of posterior femora and tibiæ, and the posterior tarsi black. Wings hyaline, the costa white, stigma fuscous.

Length 2½—2¾ lines.

Ab.—*a.* The black line on the femora extending to the middle above.

This species differs only from *N. conductus* in having the antennæ shorter, the mouth white, and the posterior femora with only a small black spot on the apex, the anterior femora being quite white. It is also somewhat smaller. Thomson considered *conductus* to be a variety of the present insect, yet as I have never bred it (often as I have reared *conductus*) from the grass-feeding larvæ I prefer in lack of evidence of the earlier stages of Hartig's species to regard the two as good species. I have never seen the ♂ of *obductus*, and have only seen a single specimen of the ♂ of *conductus*.

This insect is common, and appears during May and June. The known Scotch localities are—Clydesdale, Rannoch, about 2000 feet up on Schiehallion, Braemar, Kingussie, Kintail, and Sutherlandshire. English habitats are—Newcastle (Bold), Manchester, Gloucester, and the London district. This is the commonest species of the two in Scotland. In England it appears to be rare.

It is also a native of Sweden, Tyrol, Germany, and France.

42. NEMATUS CONDUCTUS.

Vol. I, Pl. IV, fig. 8, lar.; Vol. II, Pl. XX, fig. 2, Saw.

Nematus conductus, Ruthe, Stett. Ent. Zeit., 1859, p. 306; Cam., Fauna, 35, 26; André, Species, 175, 235; Cat., 19,* 118.
— *graminis*, Cam., E. M. M., x, 221; Br. and Zad., Schr. Ges. König., xxiv, 155, 139.
— *obductus*, var. Thoms., Hym. Scand., i, 114, 39.

Antennæ black, finely pubescent, as long as the body. Head black, pubescent, and finely punctured above and in front; labrum blackish; palpi fuscous at the base, remainder whitish-green. Thorax black, shining, minutely punctured above, and covered with white down on the pleuræ and sternum; tegulæ white, pronotum thinly edged with white. Legs covered with white pubescence, coxæ white, the anterior black at the base; four anterior femora sordid white, irregularly encircled with black from near the extreme base to the middle, the second pair with the black extending nearer to the apex than in the first pair; posterior black, white at the base; the tibiæ white, except the posterior which are black at the apex; the anterior tarsi are slightly fuscous at the joints; posterior quite black. Wings hyaline, iridescent, the costa whitish, stigma fuscous, the nervures of the same colour, but paler at the base. Abdomen whitish-green, with the dorsal surface black except at the apex.

The ♂ has the antennæ longer and more pilose, the tegulæ and pronotum black, the apical half of the posterior tibiæ of the same colour; the anal lobes narrowed at the apex, pale testaceous, and gaping considerably.

Length 2¾ lines.

In some examples the anal segments are fuscous, and the quantity of black on the legs is subject to slight variations.

Larva. Head green, flat in front, and with a fuscous tinge, a darker line down the centre, eye spots black, the mouth brownish-black. The body is cylindrical, entirely grass-green, the sides slightly overhanging the legs, and the entire skin is covered with longish hairs. The legs are glassy white, claws blackish.

The larvæ feed on various low grasses (*Poa*, *Festuca*). They are rather irritable, and when touched lash the body about. As I have reared the imago in July from larvæ collected in June it is probable that there are two broods in the year. The single cocoon is spun in the earth.

The flies appear in April, May, and June, and possibly, as above explained, in July and August.

They are tolerably common. In Scotland I have taken them in Clydesdale, Moffat, Perthshire, Aberdeenshire, Inverness-shire, Ross-shire, and Sutherlandshire. I have seen English specimens from Newcastle (Bold), Manchester, Norwich, St. Albans, the London district, Glanville's Wootton, Exeter, and Gloucester.

The species was discovered in Iceland by Staudinger. It has since been found in Sweden and Germany.

43. NEMATUS LEUCOGASTER.

Pl. XX, fig. 4, Saw.

Nematus leucogaster, Htg., S. E. Z., 1840, 23, 19; André, Species, i, 179; Cat.,* 19, 114; Br. and Zad., Schr. Ges. König., xxiv, 151, 134; Dbm., Consp., 9, 88.
— *punctulatus*, Dbm., l. c., 9, 89; Thoms., Opus., 626, 27; Hym., Scand., i, 117, 42; Cam., Fauna, 35, 27.
— *cubitalis*, Dbm., l. c., 9, 90.
— *hypoleucus*, Foer., Verh. Ver. Rheinl., xi, 304, tab. v, fig. 19 (wing).

Black, shining, vertex almost opaque, finely punctured, the sutures and pentagonal area distinct; mesonotum with a few scattered punctures; clypeus, labrum, palpi, tegulæ, pronotum at the sides, belly, extreme apex of abdomen, trochanters and tibiæ, white; the rest of the legs reddish, except the base of coxæ, apex of posterior tibiæ, and the tarsi, which are blackish. Antennæ nearly as long as the body, tapering considerably towards the apex, the third and fourth joints equal. Calcaria long, the cerci projecting outwards and inwards over the saw, the sheath of which is black. Wings hyaline, with a fuscous tinge towards the apical half; the costa white, stigma fuscous; the first transverse cubital nervure is distinct, although faint; the third cellule is one fourth longer than broad, the second recurrent nervure is received a little in front of the second transverse cubital or almost joined to it.

Length 3—3½ lines.

Ab. Wings much shorter than body.

The punctured vertex, whitish belly and costa with the testaceous stigma, and pedal coloration will readily distinguish this species. Sometimes the dorsal segments of abdomen are white at their junction, and more rarely there is a very thin brown ring surrounding the eyes. The ♂ appears to be quite unknown, neither is anything known of the larva.

A common species found in June, at the end of July, and beginning of August. It is generally distributed in Scotland from the border to Sutherlandshire. In England I have seen specimens from Manchester (Chappell), and Glanville's Wootton, Dorset.

The only Continental localities I know of are Sweden, Germany, and France.

44. NEMATUS STRONGYLOGASTER.

Pl. IV, fig. 7, ♀; Pl. XXII, fig. 6, Saw.

Nematus strongylogaster, Cam., Fauna, 42, 52; André, Species, i, 195; Cat., 18,* 82.

Antennæ longer than the body, black, bare, tapering towards the apex; the third joint longer than the fourth. Head narrower than the mesothorax, black; the eyes surrounded with a pale brown band; clypeus and labrum white, tips of mandibles piceous; vertex shining, coarsely punctured, the frontal area distinct; the front broad; antennal fovea large, deep; antennæ widely separated. The clypeus deeply and broadly emarginated, palpi long, fuscous. Thorax black, shining; mesonotum with a few fine punctures; pronotum broadly edged with white; pleuræ half shining, punctured; the tegulæ white. Wings ample, longer than the body, iridescent, hyaline, with a fuscous tinge; the costa and stigma testaceous; the first transverse cubital nervure is somewhat faint in the middle; the second recurrent nervure is received about the length of the second transverse cubital nervure in front of the same; the third cubital cellule longer than broad, widened at the apex. Legs long, testaceous, the coxæ, trochanters and base of femora white; the apex of posterior tibiæ and all the tarsi fuscous black; posterior tarsi longer than tibiæ, posterior tibiæ deeply grooved. Abdomen not much longer than head and thorax, broad, broadly rounded at the apex; cerci long, pale; the back black, the extreme apex, sides, and belly testaceous. Saw broad, the sheath black at apex, hairy, projecting. ♀.

Length 2¾ lines.

In its general coloration *strongylogaster* closely resembles *N. leucogaster*, but the antennæ are longer in proportion to the length of the body, the eyes are broadly surrounded with brown, the clypeus white; the stigma and costa are similarly coloured, the costa not being paler than the stigma in Hartig's species; the second recurrent nervure is received much farther from the second transverse cubital, and the abdomen is much shorter. It is also not unlike, at a first glance, some of the darker forms of *N. consobrinus*, but the abdomen is shorter compared to the head and thorax, and not keeled, nor so sharply pointed at the apex, the costa and stigma are paler, the incision in the clypeus deeper and broader, and antennæ longer compared to the body.

Seemingly not common. I have taken one specimen in Kilsyth Glen, and another near Cannisburn.

45. NEMATUS PULCHELLUS.

Pl. XX, fig. 5, Saw.

Nematus pulchellus, Cam., Trans. Ent. Soc., 1882, 537.

Black, shining, smooth, covered with close white pubescence; labrum, clypeus, pronotum broadly, the metapleuræ, the sides, apex, and lower side of abdomen with the legs pale yellowish-white, a small fuscous spot on the base of coxæ behind. Antennæ nearly as long as the body, filiform, covered with microscopic pubescence, the third joint distinctly shorter than the fourth. Frontal area distinct, bluntly rounded at the apical corners, almost oval, the apex very slightly indented by the large, deep, and well-defined antennal fovea. Front sharply projecting; clypeus broadly, but not deeply, incised. Spurs as long as the cerci. Posterior tarsi and apex of tibiæ infuscated. The blotch is very large. Wings hyaline, costa and stigma yellowish-white; tegulæ yellowish-white; third cubital cellule much longer than broad, and nearly double the width of the base at the apex. Claws subbifid.

Length 2¼ lines.

This species appears to agree very closely in coloration with *N. incompletus*, Foerster, but the antennæ of that species would seem to be much shorter if I might judge from the description, "Fühler länger als der Hinterleib." It has also the costa brown, and apparently the metapleuræ are black; at least, he says, "Am Mittelleib nur der Halskragen gelb." The only British species with which it agrees in general coloration is *N. leucogaster*, but that species may be known from it by its shorter, thicker antennæ, punctured head, black metapleuræ, base of coxæ, and fuscous stigma.

XIII. THE GROUP OF MILIARIS.

Colour green, turning to straw-yellow when old, or pallid yellow throughout. The vertex is more or less marked with black, the mesonotum usually bears three or more black marks, or may more rarely be entirely black, as is usually the case with the metanotum. The dorsum of abdomen is always marked with black transverse lines at the base, or it may be entirely marked with black. In only one species (maculiger) *is the underside marked with black. Antennæ as long, or it may be shorter, than the body, thin, usually black above, pale beneath; the third joint as long or shorter than the fourth. Clypeus slightly incised. Cerci usually as long as the spurs; claws bifid. Stigma green or pallid yellow. The saws are slenderly built, short, the indentations rounded and with very minute teeth, only discernible with a high power.*

The males are entirely black above, and the pleuræ and sternum are also marked with black. The antennæ are usually shorter and thicker than in the ♀; stigma fuscous or griseous.

The species in this group are very difficult to separate, and with one or two of them it is almost impossible to do so with the perfect insects. With these, in fact, the only safe mode of discriminating them is to rear them from the larvæ.

The synonymy of the authors prior to Thomson is very difficult to elucidate owing to their descriptions and figures agreeing with several of the forms I have here treated as distinct species. I am not sure if the species I have called *miliaris* is truly the Panzerian one which is regarded by Thomson as probably the same as *N. croceus*, but I believe it represents one of the green species. As the name has been adopted by Zaddach and André for one of the latter I think it best to use it, and have applied it to what is apparently the commonest species.

Synopsis of Species.

1 (6) Meta- and mesonotum entirely black.
2 (3) Breast black. ***Maculiger.***
3 (2) Breast not black.
4 (5) Head entirely black behind. ***Lacteus.***
5 (4) Head only black in the centre behind. ***Orbitalis.***
6 (1) Meso- and metanotum not entirely black.
7 (8) Colour pale testaceous-yellow, stigma yellow, antennæ short. ***Palliatus.***
8 (7) Colour green or pale greenish-testaceous, becoming straw-yellow at death; stigma green or pallid yellow.
9 (12) Scutellum marked with black.
10 (11) Scutellum with a broad black line down the middle, spurs very short. ***Curtispina.***
11 (10) Scutellum black at apex, spurs not very short. ***Viridescens.***
12 (9) Scutellum without black. ***Miliaris, glutinosæ, salicivorus.***

46. NEMATUS LACTEUS.

Vol. I, Pl. VI, fig. 8, lar.; Vol. II, Pl. XX, fig. 7, Saw.

***Nematus lacteus*, Thoms., Hym. Sc., i, 155, 88; Cam., Fauna, 41, 48; André, Species, i, 194; Cat., 25,* 196; Br. and Zad., Schr. Ges. König., xxiv, 160, 145.**

Pale greenish-yellow, a large mark on vertex, the whole of meso- and metanotum, a line of broad, transverse, almost continuous bands on back of abdomen, black; apex of posterior tibiæ and tarsi black. Antennæ shorter than the body, black, attenuated at the apex; the third joint longer than fourth. Wings hyaline, costa and stigma greenish-white; spurs longish, but scarcely reaching to middle of metatarsus.

The ♂ has the black mark on vertex if anything more extended, and more narrowed behind; the mesothorax is entirely black; the metanotum and back of abdomen entirely black. The antennæ are shorter than body, stout, pilose, brownish on underside, the third joint

shorter than the fourth; apical half of hinder tibiæ and tarsi blackish; stigma griseous white, costa darker.

Length 3½—4 lines.

Of similar form and size to *N. curtispina*, but differing from it in having the incision in clypeus deeper, spurs longer, antennæ shorter, stouter, and blacker, and in the entirely black back of thorax.

The larva has been found on *Salix vitellina* by Mr. J. E. Fletcher, to whom I am indebted for the opportunity of describing it. The head is black, with the mouth paler, the body dull green, orange over the legs and on the second and two last segments. Legs green, claws and a spot on tibiæ black; claspers white with a tinge of orange. At the base of first pair of legs is a black spot, a large almost square one over the two following; above these is a smaller spot, and a larger one is over the basal spot on front legs. In a line with these, on the fourth segment, is a roundish dot; above each clasper are two dots (in a line with above-mentioned one on fourth segment), one roundish, the other double its length, broader behind than before. Over the penultimate segment the dots are smaller, and almost equal in size, but the upper larger than lower. In front of basal mark on front legs is a longish oblique mark. Above this lower row of black marks is another row as follows: between the first and second pair of legs a triangular black mark, following this is a longer narrower mark, then a large triangular mark in front of third pair of legs; then come a longer and narrower and a shorter one; slightly higher are two rounded marks, the first the smaller; then in front of each clasper (commencing with the second pair) we have a large oblique mark followed by two rounded ones in a line to the penultimate, which has only one dot in front of oblique one. Over this line again is a row of broader, shorter, almost continuous marks to the penultimate, and a row of smaller dots goes down the centre of the back. Of the second lateral line there is only one dot on the second segment; on back two small dots commence like the central row on the same segment. Over the anus is a large mark, rounded at base, and ending in the two large cerci, which are also black. A thin white line goes through the spiracles down the sides. The ventral warts are orange.

Length 7 lines.

The larvæ are gregarious, many feeding on the same leaf. In habits and mode of feeding (as they are in coloration) they are identical with the larvæ of *N. pavidus.*

Local. Worcester.

Continental distribution, Sweden.

47. NEMATUS MACULIGER.

Pl. XX, fig. 6, Saw.

Nematus lacteus, Thoms., var. *b*, Hym. Sc., i, 155, 88.
— *maculiger*, Cam., Trans. Ent. Soc., 1882, p. 538.

Pale yellowish-white, head darker, more testaceous, a large mark on vertex, extending to base of antennæ, a large mark on breast, and the whole of meso-metanotum and back of abdomen (except at junction of segments) black; apex of hinder tibiæ and tarsi blackish. Antennæ short, filiform, black above, brownish beneath; the third and fourth joints subequal. Spurs about a third of the length of metatarsus, and not much longer than cerci.

The ♂ has thicker, more pilose, and longer antennæ, the mark on vertex is larger, more extended, laterally and behind; mesothorax entirely black, as well as the whole upper part of the body; the basal half of hinder tibiæ and tarsi black; the stigma griseous.

Length 2¾—3½ lines.

Very closely allied to *N. lacteus*, but slightly smaller; the antennæ are shorter, with the third joint shorter compared to the fourth, and they are lighter coloured on lower side, the black mark on vertex is wider at the sides, continued on either side to the antennæ, and in the middle to the antennal fovea; behind it is usually more distinctly narrowed than the middle portion; the breast is black, the spurs slightly shorter. The head is narrower behind the eyes.

The males of the two species are not readily separated, but *maculiger* has the antennæ more rufescent beneath, with the third joint longer compared to the fourth; the mark on vertex is larger, the front is not so sharply pointed between the antennæ (in both sexes). In both species the amount of black on hinder tarsi and tibiæ and back of abdomen varies.

The larva has been found by Mr. Fletcher. It is very like that of *N. lacteus*, but paler. Its habits are those of *lacteus*.

Rare and local. Clydesdale, Worcester.

Continental distribution. Sweden.

48. NEMATUS ORBITALIS.

Pl. XXI, fig. 5, Saw.

Nematus orbitalis, Cam., E. M. M., xx, 265.

Pallid green, the head from the base of the antennæ, including the whole of the frontal area, vertex between the sutures and the occiput behind, meso-metanotum, and a broad continuous band on dorsum of abdomen, black. Antennæ as long as the thorax and abdomen together, black above, brownish beneath, third joint nearly as long as the fourth. Wings hyaline, nervures blackish, costa pale at the base, stigma greenish-white. Vertex finely punctured, sutures deep, an indistinct transverse one behind the ocelli. Posterior tarsi lined with fuscous above. The apex of posterior tibiæ and the apices of the joints of anterior tarsi black. Spurs acutely pointed, about one third of the length of metatarsus.

The ♂ has the antennæ longer and thicker, the third joint is shorter than the fourth; the underside of the body testaceous; the tarsi are darker coloured, and there is a short line on the posterior femora above. The last abdominal segment is keeled on upper side.

Length 2¼ lines.

This species comes very near *N. lacteus*, from which it differs in coloration only in the part immediately behind the sutures on vertex being black in both sexes, while in *lacteus* the entire head is black behind except at the extreme edges; otherwise the present species differs from *lacteus* in having the front and vertex punctured, the antennæ if anything longer and lighter coloured, the clypeus not so deeply indented, the recurrent nervure in posterior wings is not interstitial, and lastly, as will be seen from the figures, the saws are very different.

The ♂ differs from that of *N. lacteus* in having the antennæ longer, these being longer than the body, more densely pilose, more slender; the last segment is more distinctly keeled above and beneath; it is much broader at the apex, not being brought to a point in the centre. In coloration it differs in having only a longitudinal black mark under the wings, while the entire mesothorax in *lacteus* is black. So far as I know this is the only species of the section which has not the head entirely black behind.

Rare. Cadder Wilderness, Ballantrae, Ayrshire.

Continental distribution: Germany.

49. NEMATUS PALLIATUS.

Vol. I, Pl. IV, fig. 13, lar.; Pl. VI, fig. 6, lar.;
Vol. II, Pl. XX, fig. 8, Saw.

Nematus palliatus, Dbm., Consp., 84; Thoms., Opus., 635, 45; Hym. Sc., i, 154, 87; Cam., Fauna, 41, 47; André, Species, i, 194; Cat., 25,* 197; Br. and Zad., Schr. Ges. König., xxiv, 160, 142; Taf. i, f. 5.

Pale yellow, browner above, and covered with white pubescence, a large mark on vertex extending to near the antennæ, a mark on middle, and on each of the lateral lobes, with a smaller mark on inner side of the latter at the apex, a large spot on each side of scutellum, the apex of the scutellum, and a row of somewhat triangular marks on back of abdomen, black. Antennæ shorter than thorax and abdomen, reddish beneath, black above, and at the base; the third and fourth joints subequal. Head narrowed behind the eyes. Cerci short, spurs not half the length of metatarsus, which is shorter than the three following joints together. Stigma griseous-white.

The ♂ has the antennæ as long as the body, pilose, the third joint distinctly shorter than fourth, rufescent on lower side, the mark on vertex larger than in ♀, and reaching to the base of antennæ. Mesonotum black, basal half of scutellum dark testaceous, the black band on abdomen becomes narrowed towards the apex, the sides of abdomen and thorax and belly rufescent, stigma griseous-white.

Lenth 2¼—3½ lines.

Smaller than *N. curtispina*. The antennæ are shorter, spurs longer, head more narrowed behind the eyes, longer and more rounded in front, not contracted on the outer side of antennæ. Only the apex of scutellum is black, and the body wants entirely the green tinge.

Thomson says that the scutellum in the ♂ is completely black, but in most of my specimens it is only partly so as in the ♀.

The larva has the head pale brown, inclining to orange; on vertex is a large broad-black spot, and a smaller one goes from the eye to the side; mouth dark brown. Legs pale green; claws pale brown. Body with the upper half dark green, the sides white. At the base the legs are marked with black, sometimes extended into an irregular interrupted band, but faintly indicated over the thoracic legs. Cerci pale red.

This is a stouter larva than the others in the group. It feeds on *Salix pentandra*, *S. cinerea*, &c.

Not uncommon. Clydesdale, Kingussie, Worcester.

Continental distribution: Sweden, Germany, France.

Obs.—According to Zaddach (*l. c.*), *N. virescens*, Htg., is a synonym of the present species.

50. NEMATUS CURTISPINA.

Vol. I, Pl. VI, fig. 7, lar.; Vol. II, Pl. III, fig. 3, ♀; Pl. XXI, fig. 1, Saw.

Nematus curtispina, Thoms., Hym. Sc., i, 152, 84.
— *miliaris*, Br. & Zad., Schr. Ges. König., xxiv, 158, pl. 7, fig. 1 (lar.).

Pale greenish-yellow, a mark on vertex (narrowest behind), three large, almost continuous spots on mesonotum; a mark on scutellum, usually narrowest at base, metanotum and a line of broad tranverse marks on abdomen, black. Antennæ scarcely as long as the body, filiform, the basal four or five joints black above, the rest reddish-fuscous, the third joint shorter than fourth. Spurs short, thick, scarcely half the length of cerci. Frontal area long, the lower part ending in a sharp angle, and enclosing the antennal fovea. Middle furrow on vertex not very distinct. Wings hyaline, stigma greenish-white. The apex of hinder tibiæ and tarsi fuscous.

The ♂ has the antennæ long, pilose, rufescent, except at base; the black mark on vertex extends to the base of antennæ, where it is narrower than it is behind; breast black; the pleuræ and abdomen at sides and apex rufescent; costa and stigma fuscous; hinder tarsi and apex of tibiæ blackish.

Length 3—3½ lines.

The larva has the head pale brownish-green, the mouth darker, a black line enters the eye spots from above. Body green, a broad white pulsating band on back, and a thin thread-like white line goes through the spiracles. The skin is smooth, scarcely in folds, or marked with black. Cerci reddish. Legs yellowish-green, with brown claws. It feeds on *Salix alba*, *S. fragilis*, and *S. pentandra*.

Probably common. Clydesdale, Worcester.

Continental distribution: Sweden.

51. NEMATUS VIRIDESCENS.

Pl. XXI, fig. 2, Saw.

Nematus virescens, Thoms., Hym. Sc., i, 153. 85; Br., Schr. Ges. König., xxiv, 161, 144, *non* Hartig.

— *croceus*, var. g. Thoms., Opus., 637.

Pale green; antennæ, vertex largely, metanotum (sometimes the extreme apex of scutellum), and the back of abdomen broadly, black. Antennæ not much longer than the abdomen, the third joint considerably shorter than the fourth, and not much longer than the long diameter of the eye; frontal area clearly defined, longer than broad, the apical edges angled. Cerci short, spurs not reaching to the middle of metatarsus; apex of posterior tibiæ and the tarsi more or less black.

Length 2¼ lines.

From *N. palliatus* this species may be known by the green tint of the body and stigma, by the antennæ being quite black, or at least but very slightly brownish at the tips underneath, by the smaller cenchri, shorter cerci, and the antennæ also are apparently shorter in proportion. From *N. curtispina* the longer spurs at once separate it, as do likewise the shorter and darker antennæ. The broad continuous black band on the back of the abdomen, and the greater extension of black on the vertex and thorax, distinguish it from

N. glutinosæ, *N. salicivorus* and *N. miliaris*. Thomson gives as a specific character of some value the fact of the third joint of the antennæ being not much longer than the long diameter of the eye; and this is the case with most of the specimens I have; but it does not appear to be a safe character, for I find that the relative length of the third joint varies; thus one specimen of *viridescens* has it longer than the eye, and in *N. palliatus* it may be equal in length to it or longer.

The apex only of the scutellum may be black, but there may be also a black stripe through the centre as in *palliatus*.

Rare. On birch at end of May. Mugdoch near Glasgow; Norwich (Bridgman).

52. NEMATUS BERGMANNI.

Pl. XXI, fig. 3, Saw.

Nematus Bergmanni, Dbm., Clavis, 23; Thoms., Hym. Sc., i, 150, 81.
— *viridis*, Ste., Ill., vii, 30, 13.
— *virescens*, Voll., Tijd. (2), ii, 168, pl. 7. lar.
— *prasinus*, Htg., Blattw., 216, 49.
— *croceus*, var. d., Thoms., Opus., 636.

Green; the space surrounding the ocelli extending as a narrow stripe behind, a mark on middle lobe of mesonotum, a large, longer one on lateral lobes, a smaller, rounder one joining these to the scutellum, a small one between at the apex of scutellum, a large spot on either side of scutellum, the space surrounding the cenchri (much broader behind), post-scutellum, metanotum, and a row of marks (not much wider than long) on back of abdomen, black. Scutellum with one or two fuscous marks on its apex. Antennæ long, filiform, the third and fourth joints subequal; furrows in vertex distinct; frontal area not well defined; antennal furrows deep, almost straight, ending in a sharp angle. Spurs longish, as long as the cerci; posterior tarsi and apex of tibiæ blackish; stigma greenish-white.

Length 4½—5½ lines.

The largest of the green species. It comes nearest to *N. miliaris*, but the sutures on head and thorax are deeper, the cheeks wider, the antennal furrows end in a sharper angle, the head and mesonotum have a more distinct testaceous tinge, the antennæ are longer, tarsi darker, and the abdomen has every segment marked with black.

The larva feeds on the Sallow. The body is dark-green, head green with a yellowish tinge, and spotted with brown dots on the centre; a broad stripe on side of face. There is a brown mark over the eyes, and down the back is a reddish, pink, or purplish stripe. It is of similar habits to the other species with solitary larvæ.

Seemingly rare. Clydesdale. London district.

Continental distribution: Sweden, Germany, Holland.

53 NEMATUS SYLVESTRIS.

Pl. XXI, fig. 7.

Nematus sylvestris, Cam., E. M. M., xx, 266 (1884).

Green; the vertex between the ocelli, a line in centre of middle lobe of mesonotum at the base touching the pronotum, a longer line on inner side reaching from near the pronotum to the scutellum, a small round mark on either side of these at apex, a longer mark outside of scutellum, a curved line in front of each of the cenchri, and two or three narrow transverse marks at base of abdomen, black. Antennæ as long as the body, a thin black line on upper side; third joint shorter than fourth, longer than the long diameter of the eye. Wings clear hyaline. Apices of tarsal joints fuscous. Cerci short, thick.

The ♂ has the antennæ as long as the body, densely covered with close pile, the third joint a little curved, blackish above, testaceous beneath. Vertex broadly black, behind black, except at edges. Body greenish-testaceous beneath, meso- and metanotum and abdomen above, except at extreme apex and at the sides of the apical segments, black; apical segment of abdomen transverse at apex above, rounded beneath, with the edges incised. There is a short blunt keel above, which does not reach to the apex, and with a depression on either side of it. Stigma griseous-testaceous. The sides of scutellum are obscure testaceous.

Length 2¾ lines.

This species is exceedingly like *N. miliaris*, and I am not sure if the ♀ can be distinguished from the ♀ of that species; the ♂, however, may be known from *miliaris* ♂ by the keel on the last abdominal segment being much shorter, not being much longer than broad, and not reaching to the apex; in *miliaris*, on the other hand, it projects beyond the apex which is thus not transverse; the black on the vertex, too, is broader, but behind it is not quite so broad, the edges being testaceous.

The larva feeds on *Salix caprea* in August and September, eating either along the edge or in the centre of the leaf. Its head is green, with a faint yellowish tinge; there is a brownish stripe on either side going down from the vertex to the eyes; another goes down the centre of face to its middle, the top is mottled with light brown dots. Body deep green; legs glassy green, the skin is much wrinkled, and at the sides the wrinkles form oblong raised objects, which are edged with black. Over the eye is a black line. The entire body is covered with black irregular lines, which give the skin a mottled appearance, the back being also more or less covered with these lines; the centre, however, being much lighter in tint.

The single cocoon is spun in the earth, the flies emerging in the following summer.

The larva of *N. miliaris* is readily known from this by its body not being mottled with black, and by its having a distinct black lateral longitudinal line.

Rare. Cadder Wilderness.

54. NEMATUS MILIARIS.

Vol. I, Pl. VI, fig. 10, lar.; Vol. II, Pl. X, fig. 2 *a* eggs, fig. 5, lar.; Pl. XXI, fig. 4, Saw.

Tenthredo miliaris, Pz., F. G., lxv, fig. 13.
Nematus miliaris, Lep., F. Fr., pl. 11, fig. 6; Mon., 70, 211; Ste., Ill., vii, 30, 15; Cam., Fauna, 40, 46; André, Species, i, 182, pl. xiii, fig. 3 (im.), fig. 9 (lar.); Cat., 25,* 193; Br. & Zad., Schr., Ges. König., xxiv, 155 (pt.).
— *microcercus*, Thoms., Hym. Sc., i, 152, 83.
— *croceus*, var. f., Thoms., Opus. 637.

Green; the space surrounding the ocelli, three longish marks on mesonotum, and a small round one joined to inner side of those on lateral lobes, a large mark on each side of scutellum, more or less of the apex of the latter, the space surrounding the cenchri, the greater part of metanotum, and a transverse mark on the second or third basal segments of abdomen, black. Head narrowed behind the eyes, three vertical furrows distinct, frontal area not clearly indicated behind, broader than long; antennal furrows deep, ending in a blunt angle and very slightly curved, front sharply projecting between the antennæ, face sharply pointed. Antennæ slightly shorter than the body, black, fuscous beneath, the third joint shorter than the fourth; stigma green, second recurrent nervure interstitial. Cerci shorter than spurs, which reach close to the middle of metatarsus.

The ♂ has the vertex almost entirely black, the upper side of the body and the mesopleuræ black; wings with a faint fuscous tinge; stigma griseous-white; antennæ longer than the body, and apex of posterior tibiæ and tarsi black.

Length 2½—3 lines.

The larva is cylindrical, from nine to ten lines in length. The head is shining, green, slightly obscured with fuscous on the top, and thinly covered with hairs; the eyes are situated in a black line which extends to the top and a little below them; the mouth brownish, mandibles brown, black at the tips. Legs glassy yellowish-green, slightly hairy; claws brown; over the legs is a curved black line. The body is grass green, with a black line on each side at the top, and continued to the tenth segment; directly over the legs the folds of the skin are marked with black. The anal segment is hairy, the tip usually green, but occasionally reddish, and bears short black cerci.

Feeds on *Salix pentandra*, *S. vitellina*, and other willows. *Degeeria parallela*, Mg., *Mesoleius opticus*, Gr., and *M. holosericeus*, Rtz., are its parasites.

Common in Clydesdale; the imago in June, and again in August. The larvæ are found between June and October.

Continental distribution: Sweden, Germany, France.

55. NEMATUS GLUTINOSÆ.

Vol. I, Pl. VII, fig. 10, lar.; Vol. II, Pl. III, fig, 4, ♀;
Pl. XXI, fig. 6, Saw.

Nematus glutinosæ, Cam., E. M. M., xviii, 193 (1882).
— *virescens*, Cam., Sc. Nat., iv, 196.
oligospinus, Br. and Zad., Schr. Ges. König., xxiv, 159, 141, Taf. 1, f. 2.

Green, or testaceous-green; the space enclosing the ocelli, the usual marks on mesonotum, a ring surrounding the cenchri, a small one behind them, and a row of transverse stripes on dorsum of abdomen (becoming narrower towards the apex), black. Antennæ somewhat shorter than the body, filiform, black, fuscous beneath, the third joint a little longer than fourth. Head sharply bulging out behind the eyes; looked at from above, the front projects distinctly from the surrounding part, and is furrowed between the antennæ; the frontal area is well defined, square at the apex; the antennal fovea is indistinct, but a well-marked furrow comes down on either side of it from the outer side of the frontal area and curves round the base of antennæ. The central furrow on vertex is well defined, broad in front, narrow behind. Spurs a little more than one fourth of the length of metatarsus, being as long as the cerci. Stigma greenish-white.

The ♂ has the antennæ longer than the body, with the third joint shorter than the fourth, the lower part of the body and the sides of abdomen above are rufescent, the upper part black, the thorax entirely so, save an incomplete ring on scutellum, the central portion of which is black. The posterior tarsi are fuscous black; the stigma fuscous.

Length 2½—3 lines.

Very similar to *N. miliaris*, but the front is wider between the antennæ, and does not project so much; antennal fovea less defined, head smaller, cenchri smaller, spurs shorter compared to metatarsus, which is itself shorter compared to the second joint; abdomen with a broad continuous black band; the scutellum is marked with fuscous in the centre, and the frontal area is more distinct.

The larva feeds on alder. It is green, the head of a darker green, especially on the top; a black line goes on the side from the top to near the eyes, and another line runs from the top, half way down the face; mouth brownish; mandibles blackish at the top. The body is covered with tubercles of a darker colour than the body, and generally irregularly-oblong in shape. On the first and last segments they are somewhat irregularly arranged, but on the middle segments they are usually in two pairs above, and three in a line below these, while there is a longer, slightly curved, one over the claspers, and one or two smaller tubercles above it. Two curved lines are over the feet, which are glassy white with brown claws. On the back are two white lines; there is no distinct black line along the sides, beyond a thin white one running through the spiracles. The cerci are black, as well as the space immediately behind them.

It feeds on alder, and is double brooded. Probably common, but confounded with the other green species. It is parthenogenetic, only males being yielded by the eggs laid by virgin females.

Clydesdale, Worcester.

Obs.—This species is certainly the *N. oligospinus* of Brischke and Zaddach, but I am not sure as to its being the *oligospinus* of Foerster (Verh. V. pr. Rhein., xi, 312). The description of the latter in point of fact will suit two or three species, and I therefore do not care to adopt it. Brischke (l. c.) furthermore quotes *N. validicornis*, Foerster, as a synonym, but this is alike disproved by Foerster's description as by the description of its larva given by Kaltenbach (Pfl. 579). I have examined specimens of both sexes of *validicornis* in the collection of the latter, and can hardly distinguish them from *N. curtispina.*

56. NEMATUS SALICIVORUS.

Vol. I, Pl. VII, fig. 8, lar.; Vol. II, Pl. III, fig. 5, ♀; Pl. VIII, fig. 7, lar.; Pl. XXI, fig. 8, Saw.

Nematus salicivorus, Cam., E. M. M., xviii, 194 (1882).

Pale testaceous-green, the space surrounding the ocelli, continued as a small rounded mark behind, a broad band on middle lobe, a longer narrower one on lateral lobes, with a small dot on inner side at apex, a mark on either side of scutellum, the space between the cenchri (separated in the middle), black; one or two fuscous transverse marks on base of abdomen. Antennæ slender, filiform, as long as the body, black, fuscous beneath; the third joint slightly shorter than fourth. Head slightly narrowed behind the eyes, broadly rounded in front, but retreating on the outer side of antennæ, and projecting, but not sharply, between them; frontal area well marked, its lower end curved in the centre through the upper part of the large, distinct, oval, antennal fovea projecting into it; furrows on vertex distinct, but not reaching to the base; no central furrow. Clypeus with a shallow indentation. Cerci as long as posterior spurs.

Length 2½—3 lines.

Of similar size and coloration (except that the black markings are less developed) to *N. miliaris* and *glutinosæ*, but differing from both in having the head much more swollen in front, the part between the antennæ being bluntly rounded, and not furrowed in the centre, the frontal area is less raised, and not truncated at the apex, the antennal fovea is very distinct, while the curved furrows which come down on either side of the antennal fovea, and are so conspicuous in N. *glutinosæ* and *miliaris*, are scarcely noticeable; the cenchri are smaller, the antennæ thinner.

The larva has the body dark green. The head is green. In centre of head is a long black line, which reaches near to the mouth; above, over the eyes, is a much shorter lateral line. Over the legs is a blackish waved line, and above that again is a less distinct line. On the thorax are some tubercles; while over the anus is a black, sometimes more or less reddish, mark, cleft and broader behind than at the apex; the cerci black. A thin white line runs through the spiracles.

The larva of *N. salicivorus* may be known from that of *N. miliaris* by the much longer central stripe, and shorter lateral stripe on face, by the less clearly indicated black stripe on the sides above, by the clearly indicated waved lines over the legs, by the legs wanting the oblique black mark in front of them found in *miliaris*, and by the distinct black mark over anus. In habits they are identical, and are sometimes found feeding on the same bush.

Clydesdale, Worcester.

XIV. THE GROUP OF MYOSOTIDIS.

Black, pronotum more or less, abdomen and legs, yellow; the former black at base, or on the whole dorsum. Antennæ longish, pilose, especially in ♂, black, sometimes brownish beneath; first transverse cubital nervure absent or nearly so; costa and stigma luteous or testaceous; clypeus incised.

In only one species are the pleuræ and sternum testaceous. From the preceding section the difference in coloration distinguishes it; from the succeeding the incised clypeus.

Synopsis of Species.

1 (2) Legs and abdomen beneath and at sides deep brick red; stigma testaceous. *Zetterstedti.*
2 (5) Legs, abdomen and stigma luteous.
3 (4) Antennæ nearly as long as body, pronotum almost entirely pale; abdomen with a broad black band on dorsum; spurs longer than one-third of metatarsus. *Myosotidis.*
4 (3) Antennæ much shorter than body; abdomen black only at base; spurs short. *Monticola.*
5 (2) Legs and abdomen testaceous, stigma fuscous or brownish.
6 (11) Pleuræ black, posterior tibiæ not black.
7 (8) Posterior femora with a black mark at the apex; tibiæ white. *Pallidiventris.* (See Group XII.)
8 (7) Posterior femora entirely testaceous.
9 (10) Stigma fuscous, dorsum of abdomen keeled and distinctly longer than head and thorax together. *Consobrinus.*
10 (9) Stigma livid pale testaceous; abdomen not keeled, not much longer than head and thorax together; antennæ nearly as long as the body. *Strongylogaster.* (See Group XII.)
11 (6) Pleuræ testaceous; posterior tibiæ black. *Tibialis.*

57. NEMATUS TIBIALIS.

Pl. II, fig. 2, ♀; Pl. XXI, fig. 9, Saw.

Nematus tibialis, Newman, Ent. Mag. (January), iv, 260 (*cf.* Cam., E. M. M., xii, 228).
— *hortensis*, Htg., Blattw., 197, 24; Voll., Tijd. Ent., i, 151, pl. 7 (lar. imago, &c.); Zool., 1861, 7571; Kalt., Pfl., 134; André, Species, i, 205; Cat., 26,* 204; Zaddach, Schr. Ges. König., xxiv, 333.

Dark testaceous, smooth, shining, finely punctured; antennæ, vertex, three large marks on the mesonotum, the metanotum at the sides, a band on each of the abdominal segments on the back, and posterior tibiæ and tarsi, black. Wings hyaline, nervures black, the costa and stigma sordid testaceous, the latter paler at the apical half. Antennæ stout, shorter than the body, tapering towards the apex, the third and fourth joints about equal; pentagonal area distinct, antennal fovea deep, broadest above, the clypeus deeply notched, palpi pale testaceous. Mesonotum smooth, shining, punctured; breast smooth and shining; blotch large, the cerci short, blackish; sheath of saw projecting, deep black, almost bare; posterior calcaria short, not one fourth of the length of the metatarsus; second cubital cellule a quarter longer than third; the second recurrent nervure received about one-fourth of the length of the third cellule in front of the second transverse cubital nervure.

Length 3¼ lines.

There can be no difficulty in separating this insect from its allies by its black posterior tibiæ and tarsi.

The larva, according to Van Vollenhoven, has the head pale brown, with a transverse, ochreous-brown longitudinal stripe over the crown, the jaws of the colour of burnt ochre; the eyes are placed in round black spots, and the head is also covered with small black hair. The skin is deeply wrinkled, shining pale green. The legs are glassy green, as also are the ventral legs. On the last segment are yellow projections with brown margins, and it is also covered with short white hairs. Previous to spinning the green assumes a darker tint, passing into brown.

It feeds in September on *Robinia pseudacacia*, generally resting with the hind parts retracted, and not resting on the leaf. The pupa state is passed in the earth.

The imago makes its appearance in June, and in this country is confined (apparently) to the South of England, where it has been found in the Isle of Wight (Newman), near London (J. G. Marsh), and Norwich (Bridgman).

N. tibialis occurs also in Prussia, Holland, France, and Switzerland.

Obs.—The species described by Thomson (Hym. Scand., i, 144) as *hortensis* is not the Hartigian species, since he describes it as having the head black with the exception of the mouth, the legs totally pale testaceous, and the abdomen black only at the base.

58. NEMATUS CONSOBRINUS.

Vol. I, Pl. VII, fig. 5, lar.; Vol. II, Pl. III, fig. 1, ♀; Pl. XXII, fig. 5, Saw.

Nematus consobrinus, Vol., Tijd. Ent., xvi, 236, pl. x, f. 1—13, lar. im.; André, Species, i, 192; Cat., 22,* 156; Br. and Zad., Schr. Ges. König., 339.

— *umbrinus*, Zaddach, Schr. Ges. König., xvi, 84, 24; André, Species, i, 210; Cat., 26,* 209.

Antennæ nearly as long as the thorax and abdomen, tapering considerably towards the apex, the third joint a little shorter than the fourth; black, more or less fuscous or dull brownish on the underside.

Head scarcely so broad as the mesothorax, shining, roughly punctured, covered with short pale down; pentagonal area distinct, front projecting; antennal fovea large, deep; the clypeus emarginated, but not very deeply; black, the clypeus and labrum white; the outer orbits brownish. Thorax black, faintly punctured; tegulæ and pronotum pale fulvous; pleuræ half shining, smooth. Legs pale fulvous, coxæ at the base, apex of posterior tibiæ and tarsi, black; the coxæ, base of femora and tibiæ pale white. Wings ample, hyaline, iridescent, costa at base testaceous, the stigma is of a darker testaceous colour. The first transverse cubital nervure is faint; the second cellule is more than double the length of the third, angled where it receives the recurrent nervure; the second recurrent nervure is received considerably in front of the second transverse cubital. Abdomen pale fulvous, the basal half black above; the cerci long, pale white; sheath pale fulvous, darker at the apex, and pilose.

The ♂ has the antennæ compressed and of the same length as the body.

Length 3—3½ lines.

Ab.—a. As in type, but the pleuræ for the greater part pale fulvous.

b. As in type, but scutellum black?

Var.—a. Antennæ, clypeus, scutellum, pleuræ, and sheath black, the eyes not surrounded with brown; the dorsum of abdomen black to the seventh segment.

This is a rather variable species, especially in the quantity of black on the thorax and abdomen.

The larva feeds in early summer on the leaves of the gooseberry. It has a green head, marked more or less with little black points, and bearing soft hairs. The body is green, shining, the skin beset all over with transverse rows of black tubercles, each bearing a hair; the second segment, and more or less of the last, and the sides over the legs yellow; the back has a bluer tint than the rest of the body, perhaps through the food shining through. Cerci yellowish, black at the tips. When young the head is black, the body green with black points; at the last moult it loses the black tubercles, and becomes of a bright green colour, yellowish behind the head and on the last segment. The cocoon is spun in the earth. There is, I believe, only one brood in the year in this country.

Seemingly a not uncommon species. I have seen specimens from Clydesdale, Rannoch, Worcester, York, and Lastingham (Rev. T. A. Marshall).

The only Continental localities recorded are Holland, Prussia, and Silesia.

59. NEMATUS MONTICOLA.

Pl. IV, fig. 6, ♀; Pl. XXII, fig. 3, Saw.

Nematus monticola, Thoms., Hym. Sc., i, 147, 77; André, Species, i, 191; Cat., 22,* 159.

Black, smooth, shining, clypeus and labrum pale testaceous; tegulæ, the edge of pronotum, and legs yellowish-testaceous; the tibiæ pale testaceous; base of coxæ and extreme base of anterior femora black. Abdomen luteous, the base with a broad black band, which encloses the large blotch. Antennæ as long as abdomen and half the thorax, black, paler beneath; the third joint a little shorter than fourth. Wings yellowish hyaline, costa and stigma yellowish-testaceous; the third cubital cellule is a little longer than broad, and wider at apex than at base; the recurrent nervure is received a little in front of third transverse cubital, the transverse median in apical side of middle of cellule. Clypeus incised. Spurs a little more than one-third of the length of metatarsus, and a little longer than the cerci.

Length 3 lines.

Smaller than *N. myosotidis*, the antennæ much shorter, spurs shorter, the pronotum has only the edge pale, and the abdomen has not such a distinct band on back. The ♂ has the antennæ shorter and less hairy than in *N. myosotidis*, the dorsum of abdomen has a narrow black line in the centre, widest at base. *N. jugicola*, Thom., is very closely allied to it, but its spurs reach to the middle of metatarsus, the antennæ are longer, saw shorter, and the abdomen has a well-defined black band on its back.

Rare. Clydesdale.

Continental distribution: Sweden.

60. NEMATUS MYOSOTIDIS.

Pl. VIII, fig. 5—5 *c*, lar.; Pl. XXII, fig. 2, Saw.

Tenthredo myosotidis, Fab., S. P., 41, 60; Panz., F. G., Heft 98, pl. xiii,; Spin., Ins. Lig., i, 58, 18; Fallén, Acta, 1808, 119, 62.

Pristiphora myosotidis, Lep., Mon., 170, 59; Ste., Ill., vii, 25.

Nematus interruptus, Lep., F. Fr., pl. 11, f. 1; Mon., 65, 192; Ste., l. c., 33.

Nematus myosotidis, Htg., Blattw., 199, 27; Evers., Bull. Mosc., xx, 18, 15; Thoms., Opusc., 635, 76; Br. and Zad., Schr. Ges. König., xvi, pl. 6, f. 6, and l. c., 332; André, Species, i, 196; Cat., 22;* Cam., Fauna, 36, 33; Costa, F. Nap., Tenth., 16, pl. xliii, f. 8; Foer., Verh. Ver. pr. Rheinl., xi, 319, pl. vi, f. 31.
— *pappilosus*, Thoms., Hym. Scand., i, 145, 75.

Black, shining, the mouth, pronotum, tegulæ, legs and abdomen, luteous, the latter with a line of broad black bands down the middle of the back; the apex of posterior tibiæ and tarsi fuscous. Antennæ pilose, nearly as long as the body, tapering towards the apex; the third and fourth joints equal. Head a little narrower than the thorax, the front pubescent, faintly punctured, the sutures very deep and well marked, the pentagonal area distinct; the tips of the mandibles are black, clypeus deeply notched, the palpi pale. Mesonotum smooth, shining, finely punctured, the scutellum raised; cenchri large; sternum smooth and slightly shining. Abdomen scarcely longer than the head and thorax, broadest in the middle, rounded towards the apex, the cerci short, their apices pointing inwardly; the saw projecting, pilose, the apical half black; blotch very large. Legs long, the calcaria reaching to the middle of the metatarsus, the tibiæ are grooved on the inner side; claws bifid. Wings subhyaline, with a smoky tinge, the nervures deep black, costa and stigma luteous; the second recurrent nervure is almost interstitial.

The ♂ has the antennæ longer than the body, thicker and more pilose than in the ♀; the abdomen becomes narrowed towards the apex, as does also the black dorsal stripe, which is sometimes very narrow.

Length 3—3½ lines.

Ab—a. ♀ and ♂. Abdomen black only at the base.

b as in *a*, but with a thin luteous band surrounding the eyes.

This species is easily identified by the half smoky wings with luteous costa and stigma, the very faint first transverse cubital nervure, pilose antennæ, and luteous abdomen with its black dorsal line, &c. The abdomen varies somewhat in the amount of black which it bears, as does also the apex of the posterior tibiæ; the tarsi are black or fuscous, and in rare instances luteous, and there is sometimes a black mark on the posterior knees. *N. Marshalli*, Cam., from Corsica, is closely related to *myosotidis*, but may be known from it by its body being shorter, and broader compared to its length, the antennæ distinctly longer than the body, the abdomen not much longer than head and thorax, and only black at the base, and the wings fuscous.

The larva was first described by Brischke and Zaddach. It is pale green with two white dorsal lines; a blackish line goes round the forehead from the eyes, and another line goes down the face in the centre. The claws are blackish. I found these larvæ in the autumn, and they spun the cocoon in the earth. They feed on *Trifolium pratense*, the leaves of which they devour along the sides, or eat out roundish holes in the centre.

The flies appear during June and July. They are very commonly distributed. Scotch localities are: Clydesdale, Dumfriesshire, Moffat, Oban, Kintail, Sutherlandshire, Kingussie, Braemar, Perth, Rannoch, Berwickshire. English: Newcastle, Manchester, Yorkshire, Norwich, London District, Exeter, Glanville's Wootton, Gloucester, Worcester.

Its Continental distribution is very general: Scandinavia, Germany, Holland, France, Corsica (Marshall), Italy, Russia.

Obs.—Thomson considers *myosotidis* as identical with the *Tenthredo papillosa*, Retz., De Geer, a statement sufficiently contradicted by the totally different habits of the two species. The *N. myosotidis* of Brischke is *N. pavidus*, Lep.

61. NEMATUS ZETTERSTEDTI.

Pl. XXII, fig. 1, Saw.

Nematus Zetterstedti, Dbm., Clavis, fig. 5; Thoms., Hym. Scand., i, 147; Cam., Fauna, 36, 32.
— *miniatus*, Htg., Blattw., 189, 12; Opusc., 635, 47; André, Species, i, 196; Cat., 14, 26; Br. and Zad., Schr. Ges. König., 291, Taf. 7, fig. 13.

Antennæ long, thin, black, brownish beneath, the fourth joint longer than the third. Head narrower than the thorax, sutures deep and well marked, the pentagonal area very large and distinct; antennal fovea very deep, front projecting; clypeus very deeply notched, the labrum hairy, subtransverse; black, covered with dense pile, the portion below the antennæ, and a ring surrounding the eyes (except the lower posterior part) reddish; the palpi are testaceous. Thorax black, smooth, half shining, slightly pubescent; pronotum reddish, tegulæ pale red; cenchri small; the pleuræ quite smooth and shining. Abdomen narrowed and longer than the head and thorax, tapering towards the apex, the back black; the sides of the back, the extreme apex, and belly reddish; the blotch is small; the cerci pilose, black, pointing inwardly; the sheath black, scarcely projecting. Legs reddish, posterior tarsi and apex of tibiæ black; the posterior tarsi are thick, deeply sulcated, the patellæ large, claws bifid; the calcaria reddish, a little shorter than half the length of the metatarsus, the inner spur being double the length of the outer. Wings hyaline, the nervures deep black; costa and stigma reddish-testaceous; the first transverse cubital nervure is faint; second cubital cellule double the length of the third; second recurrent nervure received somewhat in front of the second transverse cubital nervure.

The ♂ (according to Thomson) has the eighth abdominal segment keeled in the centre.

Length 3½ lines.

Ab.—*a.* Antennæ brownish beneath.

b. The orbits entirely black.

c. A large spot on upper side of mesopleuræ reddish.

This large species may be recognized by the deep frontal sutures, brick-red colour, deep black posterior tarsi, deeply sulcated tibiæ, &c.

The arrangement of the colour is the same as in *N. myosotidis*, but the colour of the abdomen and legs is deep brick red, not yellowish, the antennæ are shorter than the body, and quite bare, the stigma is testaceous, not yellowish, and it is a longer and stouter insect.

The larva is described by André (l. c.) as living on *Populus nigra*. It is yellowish-green, with the head and forelegs black; on the first four segments are a great number of black points, the rest are uniformly coloured on the back, but dotted with black on the sides. Brischke bred it from a larva on aspen, which apparently did not differ from that of *N. umbripennis*.

Apparently a rare insect. I have only seen two specimens, one taken by Dr. Buchanan White at Braemar, and another in Stephens' Collection in the British Museum, said to have been taken near London.

The only Continental localities that I have seen recorded are Sweden, the Hartz Mountains, and France.

Obs.—Zetterstedti is in Stephens' collection under the name of *N.*

nigricornis, Lep., Mon., 63, 186; Ste., Mon., vii, 37, 42, with the description of which it agrees tolerably well, but is still too indefinite to warrant the sinking of the later names.

XV. The Group of Betulæ.

Body black, the abdomen, generally part of mesopleura, and always the metapleura, orange-yellow. Legs pale luteous, the apex of hinder tibiæ and tarsi black. Abdomen rarely with a row of narrow, black spots on dorsum. Clypeus truncated. Wings hyaline, costa and stigma fuscous, or black: the third cubital cellule not much longer than broad. Antennæ black, brownish beneath.

The only group of *Nemati* with which *N. betulæ* and its allies can be confounded is that of *N. salicis* which has pretty much the same coloration, including the black stigma, but differs in the species being larger, in their having the pleuræ more largely yellow, the antennæ not so decidedly yellow beneath when it is not entirely black, and especially in the incised clypeus.

Synopsis of Species.

1 (6) Mesopleuræ with a large orange-yellow mark; sides of metanotum black; abdomen black at base, or with a black line on back.
2 (5) Clypeus black at the base.
3 (4) Posterior tarsi and apex of tibiæ black; apex of clypeus white; abdomen with a black band down the back. *Conjugatus.*
4 (3) Posterior tarsi and apex of tibiæ testaceous; clypeus black; abdomen black only at base. *V. flavum.*
5 (2) Face entirely white; abdomen only black at extreme base; spurs not reaching to middle of metatarsus. *Subbifidus.*
6 (1) Mesothorax entirely black; sides of metanotum luteous. *Betulæ.*

62. NEMATUS BETULÆ.

Pl. XXII, fig. 7, Saw.

Tenthredo betulæ, Retz., De Geer, 308; De Geer, Mém., ii, 261, Taf. 37, f. 23.
— *luridiventris*, Zett., I. L., 352, 51.
Nematus betularius, Htg., Blattw., 192, 17; Voll., Tijd. Ent. (2), ii, 4, t. 6, f. 1—6; Kalt., Pfl., 607.
— *testaceus*, Jur., Hym., 64, pl. 13.
— *erythrogaster*, Thoms., Hym. Sc., i, 103, *nec* Norton.
— *crassiventris*, Cam., E. M. M., xiv, 267.
— *luteogaster*, Kirby, List of Hym., i, 132.
— *betulæ*, Htg., Blattw., 219; André, Species, i, 219; Cat., 27;* Br. and Zad., Schr. Ges. König., 307, Pl. 6, f. 16 (1875).

Black, shining, covered with fuscous pubescence; labrum, clypeus, and the space between the antennæ dull white; pronotum, tegulæ, metapleura, side of metanotum and abdomen orange-yellow; legs pale luteous, apex of posterior tibiæ and tarsi fuscous, the base of metatarsus pale; spurs pale, reaching to middle of metatarsus. Antennæ as long as the abdomen and half of thorax, black, brownish beneath from second joint, the third joint a little longer than fourth. Wings hyaline, costa pale at base, the rest and stigma black; third cubital cellule as broad as long; the transverse median nervure is received in the basal side of middle of cellule. The frontal sutures are flat; pentagonal area indistinct, the antennal fovea wide and deep. Clypeus roundly truncated. Cenchri large, clear white, the white membrane between them large, immediately behind which is a short transverse black line. Claws with a minute subapical tooth.

The ♂ has the metanotum entirely black, and the dorsum of abdomen marked with black transverse lines, which become continuous at base and apex.

Length 2¾ lines.

Easily known from the other species in the group by the totally black mesothorax, claws with a subapical tooth, and the metanotum luteous at the sides.

The larva feeds on birch. Its head is entirely black, the abdomen yellowish-green, shining, legs pale green with black claws. Over the second and third leg is a large triangular orange spot, at the same level on the fourth segment are two smaller spots, more oblong in form; and similarly coloured spots, but larger and nearly triangular, are on segments five to eleven. The stigmata have narrow white margins. It feeds on the edge of the leaf, and pupates in a simple cocoon in the earth. According to Brischke (l. c.) the eggs are laid in a pouch sawn by the ♀ in one of the teeth of the leaf.

Seemingly rare in this country. Wimbledon (Bridgman).

Continental distribution: Sweden, Germany, Holland.

Obs.—*Nematus betulæ*, Thoms., is distinct from this, although he regards it as identical with Retzius' species. *Nematus betulæ*, Voll. = *melanocephalus*.

63. NEMATUS SUBBIFIDUS.

Pl. XXIII, fig. 1, Saw.

Nematus subbifidus, Thoms., Hym. Scand., i, 105, 29; André, Species, i, 225; Cat., 24;* Br. and Zad., Schr. Ges. König., 308.

Antennæ as long as the thorax and abdomen, moderately thick, the third and fourth joints about equal; black, obscure brown beneath from the second joint. Head densely covered with fuscous pubescence, the vertex thick, semi-shining, the sutures wide, distinct, pentagonal area not clearly defined; antennal fovea large, deep black; the space between the antennæ, clypeus, and labrum pale yellowish-white; the tips of the mandibles piceous; the palpi long, white; posterior orbit in part luteous; apex of clypeus truncated; labrum roundly truncated at the apex. Thorax shining, densely pubescent, black, the tegulæ, pronotum, and anterior half of pleuræ luteous; the cenchri clear white, and there is a minute white mark between them; the metanotum pale at the sides. Wings hyaline, the costa and stigma fuscous black, the former pale at the base; the first transverse cubital nervure is distinct; the third cubital cellule is smaller, almost broader than long; the second recurrent nervure is received considerably in front of the second transverse cubital. Legs luteous, the tarsi paler, the apex of posterior tibiæ largely, and the tarsi black; the tibiæ are thickened at the apex, grooved on the inner side, and are a little longer than the tarsi; calcari short, not reaching to middle of metatarsus. Claws with a large tooth. Abdomen short, thick, luteous, the basal segment black in the centre; the sheath of saw black, projecting.

Length 2¼ lines.

The ♂ is unknown.

The nearest related species to *subbifidus* is *N. betulæ*, which, however, is larger, the wings longer, the colour paler; the nervures in the hind wings are more widely separated, while the spurs reach to the middle of metatarsus. The antennæ in *subbifidus* are longer and thinner, and do not taper so much towards the apex, being of more uniform thickness. *N. conjugatus*, Dbm. has the back of the abdomen black, the third cubital cellule is much longer than broad, and the tooth on the claw is much smaller, the spurs reach to the middle of metatarsus, the metatarsus itself being longer compared to the next joint. The abdomen may be entirely yellow, and the eyes may be broadly yellow round the borders.

A rare species seemingly. One specimen taken at Worcester by Mr. Fletcher.

East Gothland, Silesia and Frankfort-on-the-Main, are the only other localities recorded.

64. NEMATUS CONJUGATUS.

Pl. XXIII, fig. 2, Saw.

Nematus conjugatus, Dbm., S. E. Z., 1848, 177; Thoms., Opus. Ent., 623, 19; Kalt, Pfl., 558, 584; André, Species, i, 188; Cat., 24,* 184; Br. and Z., Schr. Ges. König., xvi, Taf. 111, f. 15 (lar.), l. c., xxiv, 305.

Black, shining, covered with close fuscous pubescence, labrum and apex of clypeus white, pronotum, tegulæ, a large mark in centre of mesopleuræ and abdomen orange-yellow; base of abdomen entirely black, the rest with a line of black marks; metapleura pale yellow; legs reddish-yellow, the base and tibiæ pale, darker in the middle; the apex of hinder tibiæ and tarsi black. Wings hyaline, costa pale at the base, the rest and stigma fuscous, the latter with the lower apical half pallid yellow. Antennæ black, brownish beneath, in length as long as the thorax and abdomen; the clypeus is almost truncated at the apex, the frontal sutures distinct, but not the frontal area, the antennal fovea deep. Sometimes the inner orbits, and the space between the antennæ are brownish. In rare cases the black stripe on abdomen is very much narrowed, if not absent entirely, at least on the apical three-fourths. The spurs reach to the middle of metatarsus; claws bifid.

The ♂ has the antennæ reddish, slightly blackish at the base above; the abdomen as a rule has no black on the back, and on its eighth segment above is a short carina. The antennæ are somewhat compressed.

Length 2¼—2½ lines.

The body is broader and more stumpy than it is in the other species of the group, and the wings are not so clearly hyaline.

The larva is shining clear green or yellowish-green, with the first three and last two segments orange. Head shining black, as are also the legs, except at the joints. On the abdominal segments are, on each side, black marks; above these are two, and under these three, while over each leg are two longer marks, the upper being a little in front of the lower or larger. On the first segment are two marks, on the second six, besides a large one over the leg. On the third are two pairs above, then two larger ones, one immediately below the other. On the 4th body segment are two pairs above, then three in a row, followed by two longer marks. On the penultimate segment are two rows of smaller black dots, going across the back, and the last bears also some black marks. All the orange-coloured segments bear a row higher up than the topmost row on the green segments, which have in all three rows.

The eggs are laid in holes along the edge of the leaves, especially on the teeth. The larvæ feed gregariously on the edge, with their bodies stuck out. They live on the larger leaved willows, on poplar and aspen, and are double brooded.

The species is rare in this country, so far as I know. Near Glasgow.

Parasites: *Mesoleius compressus*, Rtz. (*grossulariæ*) —probably only a variety of *M. sylvestris*, Gr.

Continental distribution: Sweden, Germany, Holland, France, Switzerland, Silesia, Hungary.

65. NEMATUS V-FLAVUM.

Nematus V-flavum, Cam., Trans. Ent. Soc., 1882, 537.

Black, shining; labrum white; pronotum, tegulæ, the greater part of mesopleura in front, metapleura in part, the edges of the middle lobe of mesonotum (forming a V-shaped mark), abdomen and legs orange-yellow; the base of abdomen with two small transverse black marks. Antennæ not much longer than metathorax and abdomen; the third joint the length of the fourth; black, dull brown beneath. Clypeus truncated at apex. Spurs scarcely reaching to middle of metatarsus; claws almost bifid. Wings hyaline; costa and stigma testaceous; third cubital cellule nearly one-fourth longer than broad. The anal segment is large and considerably developed above, where it ends in a slope, as in the *Luteus* group; the cerci are nearly as long as the spurs. ♀

Length 2¾ lines.

Allied to *N. conjugatus*, but is of a longer and broader body form. The stigma is more uniformly coloured, the third cubital cellule longer and nearly as broad at the base as at the apex, the spurs are shorter, metatarsus longer, and the apex of the tibiæ and tarsi are not black, nor are the tibiæ whitish; the cerci are longer, and the sheath of the saw is not so black, nor so hairy; the labrum is longer, and the clypeus entirely black. From *N. subbifidus* it is readily known by its black clypeus, shorter antennæ, testaceous stigma, longer third cubital cellule, testaceous tarsi and longer spurs. The colour, too, is paler, not being so orange.

An English specimen in Shuckard's collection.

66. NEMATUS FRUTICUM.

Nematus fruticum, Evers., Bull. Mosc., xx, 18 (1847); André,
Species, i, 206; Cat.,* 24, 182.
? — *analis*, Ste., Ill., vii, 35, 33.

"Head and antennæ totally black; thorax also black, immaculate; abdomen above testaceous, with the base of all but the two apical segments black above, and the two last and entire under surface rufo-testaceous; sternum and pleuræ black; legs with the coxæ, trochanters, and base of all the femora black; the apex of the last and the entire tibiæ and tarsi bright rufo-testaceous. Wings hyaline, with the nervures pitchy, and the costa and stigma bright, pale testaceous."

Length 3—3¼ lines.

"Taken in the neighbourhood of London, in June, at Darenth Wood, &c." Stephens, *l.c.*

Mr. Kirby (List of Hymen., i, 108) refers the specimen standing in Stephens' collection as *analis* to *vernalis*, Htg., S. E. Z., i, 23, 22 (which is, I believe, only *capreæ*, Pz.). He quotes *fruticum*, Evers., as a synonym, stating at the same time that the representative of *analis* agrees badly with the description. I therefore give Eversmann's description: "Antennæ, head, thorax, and first abdominal segment black; the rest of the abdomen and mouth and legs rufo-luteous, coxæ and base of femora black; wings hyaline; stigma and costa brownish-yellow. The ♀ has the eyes surrounded with yellow. Antennæ of the length of the body. Length 2⅔—3 lines."

XVI. The Group of Croceus.

Reddish-luteous entirely, or more generally with two or three black longitudinal marks on mesonotum and a row of transverse marks on abdomen. Antennæ usually long and filiform, with the third joint shorter than, or equal in length to, the fourth; in colour luteous entirely, or lined more or less with black above. Clypeus incised. Stigma testaceous.

This group agrees best in body-form and in the light coloration of the body with the preceding, but the reddish-yellow ground colour separates it. From the other reddish-yellow or yellow species the fact of the thorax being never entirely black above and never so beneath enables them to be easily recognised, except from the *Luteus* section, from which again the species differ in the short ovipositor. The species are difficult to separate; in fact, the females can only be clearly distinguished by breeding them from the larvæ. These are variously coloured and ornamented.

Synopsis of Species.

1 (2) Stigma pale yellow; antennæ and body testaceous. *Pallescens.*
2 (1) Stigma reddish-yellow; body reddish or fulvous.
3 (4) Antennæ short, not much longer than abdomen; wings fulvous; body reddish-yellow. *Glottianus.*
4 (3) Antennæ longish, longer than abdomen; wings hyaline.
5 (6) Body narrow, abdomen becoming gradually narrowed towards the apex, distinctly longer than head and thorax together; the base black. *Croceus.*
6 (7) Body broad, abdomen broad, rounded at apex, scarcely longer than head and thorax. *Cadderensis.*
7 (6) Body longish, abdomen distinctly longer than thorax and head, tapering towards the apex; clypeus deeply incised. *Dorsatus.*

67. NEMATUS CROCEUS.

Pl. XXIII, fig. 5, Saw.

Tenthredo crocea, Fall., Acta, 1808, 122, 65.
— (*capreæ*) *salicis*, De Geer, Mém., v, 264, 17, pl. 38, f. 1.
Nematus dorsalis, Lep., Mon., 70, 213?
— *testaceus*, Ste., Ill., vii, 29, *non* Htg. (cf. Cam., E. M. M., xiii, 174).
— *fulvus*, Htg., 194, 19; Br. and Zad., Schr. Ges. König., xvi, pl. 1, f. 12 (lar.); Cam., Fauna, 139, 42; Kalt., Pfl. 578; Costa, Fauna di Nap., Tenth., 18, pl. lxiv, f. 2.
— *trimaculatus*, Voll., Tijd. Ent., v, 69, 71, pl. 4.
— *croceus*, Thoms., Hymen. Sc., i, 149; André, Species, i, 202; Cat., 23,* 172; Br. and Zad., l. c., xxiv, 293.
— *flavus*, Gimmerthal, S. E. Z., 1844, p. 36.
— *purus*, Foer., Verh. pr. Rhein., xi, 278, Tab. iii, f. 1, *a*, *b*.

Antennæ about the length of thorax and abdomen together, rather thin, luteous, with a black line above; the basal two joints almost entirely black. Head luteous, face below the antennæ paler, the tips of the mandibles piceous; ocelli black; frontal sutures well marked, pentagonal area large, distinct, the fovea between the antennæ deep, somewhat triangular; the forehead projecting, clypeus broadly notched, labrum hairy, eyes small and oval. Thorax luteous, the pronotum and tegulæ paler; there is a long thin black line in the centre of the anterior part of the mesonotum, and another smaller black mark on each side; there is also a black spot at the base of the scutellum, and on the outside of the cenchri; the cenchri are white, the scutellum is a little raised. Abdomen rather flat, luteous, the base black and on each segment above is a black transverse line; the cerci are luteous, the sheath black. Legs luteous, the coxæ and trochanters pale, the apex of posterior tibiæ and a mark on each tarsal joint black; the calcaria being also black and a little more than a quarter the length of the metatarsus; the posterior tarsi are shorter than the tibiæ. Wings ample, iridescent, hyaline, the nervures fuscous, yellowish at the base, costa and stigma luteous, the latter slightly black at the base, and the former has the inner edge quite black.

The ♂ has the antennæ the length of the body, the scutellum pale with a black spot in the middle, the rest of the upper part of the body and a mark on the breast black; the stigma fuscous.

Length 3½—4 lines.

Ab.—*a.* As in type, but the abdomen without any black bands.

b. Body entirely luteous.

This species is very similar in form and coloration to *N. cadderensis*, but the antennæ are longer and thinner and more distinctly lined with black above, the vertex is usually marked with black, the frontal furrows are more distinctly indicated. The frontal area is not so well defined behind, nor is the middle furrow of vertex so well marked at its base. In the centre of the area at its apex there is a narrow furrow, especially noticeable if looked at from behind, while in *cadderensis* this furrow extends to the side, so that the area has a hollow appearance, the area itself being clearly marked behind the front ocellus, and the middle vertical furrow is quite distinct. The body is longer and narrower; the mesonotum is scarcely punctured. The wings are clear hyaline, while in *cadderensis* they are distinctly yellowish; the third cubital cellule is shorter, being not much longer than wide; the second recurrent nervure is received farther from the transverse cubital; the stigma has usually its lower edge black at the base; nervures blacker; the tarsi are not paler than femora, and are as a rule darker than in the other species; the spurs are shorter than in *cadderensis*; and the tarsi are longer compared with the tibiæ.

The ♂ of *cadderensis* differs from that of the present species in having the thorax entirely black.

The larva has the head black, the mouth paler; the three thoracic segments, and the three anal segments reddish-orange. The rest of the body is pale bluish-green. On the green part are three rows of black dots, the first row almost continuous, the second more widely separated, there being only four on each segment; the third row is composed of a smaller dot in front, placed a little higher up, and two long ones, following each other in a line. There is also a black line over the legs. These black marks are irregularly placed and much fewer on the orange parts, there being, however, a line across the back, and there is a large oval mark over the anus, joined to the black cerci.

The larvæ when young make holes in the middle of the leaf, but as they get older they feed along the edge, often four or five being seen on one leaf. When young they are dark green, and the markings are not distinctly indicated. They often do considerable damage to the various willows on which they feed. There are two broods in the year, the autumnal one being as usual the largest. The double cocoon is spun in the earth.

As parasites Brischke records *Mesoleius aulicus*, Gr., *M. opticus*, Gr., and *Cteniscus frigidus*, Holm. (not a British species).

Not a common insect. In Scotland I have captured it near Glasgow, Rannoch, Kintail, Aberdeen (Trail), and Sutherlandshire; that from the last-mentioned locality being the *Ab.—b.* I have seen several English specimens, but do not know their exact localities.

Stephens' specimens of *N. testaceus* are said to be from near London. Mr. Fletcher has taken it at Worcester.

Its continental distribution is Scandinavia, Siberia, Germany, Holland, France, and Italy.

68. NEMATUS CADDERENSIS.

Vol. I, Pl. IV, fig. 10, Lar.; Vol. II, Pl. I, fig. 5 ♂; Pl. XXIII, fig. 4, Saw.

Nematus cadderensis, Cam., E. M. M., xii, 127; Fauna, 39, 44; André, Species, i, 184; Cat., 23,* 167.

Antennæ a little longer than the abdomen, luteous, the two basal joints black; the third, fourth, and fifth joints almost equal in length, the rest short. Head bright luteous; the ocelli brownish, labrum and clypeus whitish-yellow; antennæ at the base surrounded with black. Thorax bright luteous, shining, punctured, the pronotum slightly paler than the mesothorax; two (often three) black longitudinal stripes are on the mesonotum; the large white cenchri are surrounded with black. Abdomen short, thick, and broad, of the same colour as the thorax, the upper surface from the base to the commencement of penultimate segment black; the cerci are very short, hairy, and of a pale yellow colour, the anal segment being also hairy; the blotch is pale yellow; the sheath of the saw faintly marked with black. Legs pale luteous; the coxæ, trochanters, and tibiæ whitish-yellow; the posterior tarsi with the apex of the posterior tibiæ pale fuscous; claws bifid. Wings longer than the body, hyaline, iridescent, with a decidedly fuscous-yellowish tinge; the costa and stigma testaceous; nervures black; the second recurrent nervure is received a little in front of the transverse cubital. The whole body is covered with close whitish down.

The ♂ has the antennæ entirely black, sometimes faintly fuscous at the apex, shorter and thicker than in the ♀, and taper considerably towards the apex. The head (mouth excepted), meso- and metathorax, and abdomen above, black. The wings also are shorter in proportion to the body than in the other sex, and in some specimens the eyes are surrounded with luteous.

Length nearly 4 lines.

Differs from *N. glottianus* in being larger, the colour is much brighter, the antennæ are longer and more attenuate, tarsi distinctly shorter than the tibiæ and the spurs longer; the centre of the frontal area is deeper, that of *glottianus* not being hollowed out at all, so that its edges are much more clearly defined, and its apical corners are more rounded; the face and tarsi are paler.

Larva. Head punctured, deep black. Feet white, tips of claws black, claspers whitish-grey. The ground colour of the body is slaty-grey, darker on the top, probably through the food shining through. On the back, close to the side, is a broad black band, composed at the end of the body of disunited oblong marks, but anteriorly they are continuous. Down from this line, and touching it, are eleven oblong, deep orange marks, divided by the fold of the skin in the centre. Below these, and touching them, is a line of oblong black marks closely packed together, but not united, small at the second segment, but gradually getting larger as the tail is reached. Directly over each clasper, and a little on the hinder edge, is a long, slightly oblique black mark, longer than the clasper itself, and there is also a similar mark over the fifth. Before the first pair of feet is a curved, oblique line. The anal segment bears a large somewhat triangular mark, in front of which are two oblong black marks. On the belly, which is slaty-grey, are seven black marks. Length 1¼ inches. The body is stout and cylindrical.

The larvæ are gregarious, but not so much as the larvæ of *N. glottianus*, which they resemble, as they do also those of *N. melanocephalus*. They feed on birch and on *Salix pentandra* in June and August, but there seems to be only one brood in the year. *Bassus peronatus*, Marshall, is the parasite.

Probably not uncommon. Clydesdale, Kingussie, Rannoch.

69. NEMATUS GLOTTIANUS.

Pl. I, fig. 4 ♀.

Nematus glottianus, Cam., Trans. Ent. Soc., 1882, 536.
— *caddrensis*, Cam., E. M. M., xii, 128 (lar. only).

Dark reddish-luteous, the hinder edge of vertex and a longitudinal line on each of the lateral lobes of mesonotum black. Antennæ pale testaceous, not much longer than abdomen and metathorax, stout, attenuated at the apex, the third and fourth joints almost equal, the apical joints slightly fuscous. Mesonotum finely punctured. Wings yellowish-hyaline, stigma and costa testaceous; third cubital cellule one-fourth longer than broad. Tarsi nearly as long as the tibiæ; extreme apex of all the joints fuscous; metatarsus not double the length of second joint; spurs one-third of the length of metatarsus. ♀ Length 3 lines.

The larvæ feed gregariously on the leaves of *Salix cinerea* in the autumn. The head is a little narrower than the second segment, intensely black, slightly punctured, the sides of the mouth somewhat greenish. Feet glassy-white, with a slight tinge of green; claws black; claspers light green. Body of a beautiful dark sea-green. On the sides are ten large oval orange spots, divided by the folds of the skin in two, but quite continuous. Below these is a line of roundish irregular black dots, under these again, and over each clasper, is a longish, oblong black spot, while there are two rows of small black dots; these, however, forming the commencement of the middle line of black dots. Over the orange marks is a line of close continuous black dots, irregular, but somewhat oblong, and proceeding from the second to the twelfth segment. On the back are, at the termination of each segment, two rather small roundish dots. Directly over the anal segment is a large round black mark, much larger than any of the others. The first orange spot is directly over the second pair of legs. Length 1¼ inch.

The cocoon is of the usual form and colour, is double, and is spun in the earth. Seemingly rare. I have only met with the larvæ once, in the autumn, near Port Glasgow.

Possibly this species may be identical with *N. ferrugineus* Foer., Ver. Verh. pr. Rhein., xi, 282; Br. and Zad., Schr. Ges. König., 296.

70. NEMATUS FLAVESCENS.

Pl. VIII, figs. 9, 9 *a-b*, Lar.; Pl. XXIII, fig. 6, Saw.

Nematus flavescens, Ste., Ill., vii, 29, 10; Kirby, List of Hym., i, 125, 167, pl. vii, f. 8.
— ***pallescens***, Htg., Blattw., 216, 48; Cam., Fauna, 40, 45; André, Species, i, 180; Cat., 25, 199; Br. and Zad., Schr. Ges. König., 297.
— ***croceus***, var. h. Thoms., Opus., 637.

Nematus testaceus, Thoms., Hym. Sc., i, 153, 86; André, Species, i, 222; Cat., 25,* 194.
— *varius*, Br. and Zad., Schr. Ges. König., xvi, pl. v, f. 3; l. c., 296.

Pale yellow, face below the antennæ, the part surrounding the eyes, coxæ, trochanters, and edge of pronotum with the tegulæ, paler. Antennæ a little shorter than thorax and abdomen, the third joint shorter than fourth, the basal joints marked with black at their junction. Vertex finely punctured, pentagonal area not very distinct; antennal fovea longish, heart shaped, moderately deep; clypeus notched; the tips of mandibles piceous; palpi pale testaceous. Mesonotum reddish-testaceous, punctured; pronotum with tegulæ pale testaceous, the pleuræ smooth, shining, paler than the mesonotum; cenchri small, pale white. Wings clear hyaline, with a faint yellowish tinge, nervures at base blackish, at the apex with the costa and stigma pale testaceous; the second cubital cellule is double the length of the third; the second recurrent nervure received about three-fourths of the length of the third cubital cellule in front of the second transverse cubital. Posterior tarsi a very little shorter than the tibiæ; spurs reaching near to the middle of the metatarsus. Abdomen a very little longer than the head and thorax, slightly dilated in the middle, narrowed to a point from the fifth segment; cerci shorter than spurs, pale testaceous; saw projecting considerably, the sheath black at the extreme apex.

Length 2½—3¼ lines.

Very like the pale *ab.* of *N. croceus*, but is smaller, the colour more diluted, the antennæ shorter, cerci shorter, sheath black only at extreme apex, and nervures much paler throughout.

The larva has the head roundish, translucent whitish-grey, and covered with longish white hairs; eye-spots and tips of mandibles black, mouth brown. The upper part of the body white, assuming a greenish hue when the food canal is filled, the lower part paler than the upper; the skin is covered with tubercles, each ending in a hair. Legs white, with a line of black dots over them; claws faintly brownish. The body is flat rather than cylindrical.

It feeds on the under side of the leaves of *Salix caprea* with the colour of which it harmonises very closely. It is found from August to the end of September. The cocoon is spun in the earth, the fly appearing in the following June. The late Prof. Zaddach compared my specimens with Hartig's type of *N. pallescens*, and the only appreciable difference between the two that he could find, was that the latter had somewhat darker coloured antennæ. There is a form named *varius*, Lep., by Brischke, which is regarded by him (and formerly by Zaddach) as distinct from *pallescens;* it differs from it very slightly in the coloration of the wing nervures, and in the colour of the body being more diluted and uniform. According to Zaddach there is an essential distinction in the form and length of the saw; but the difference (if any) seems to me to be exceedingly slight; and the larvæ of the two forms are identical. In these circumstances I have not regarded these two forms as distinct species.

Mesoleius transfuga, Holmgr., is its parasite.

Common. Kintail, Braemar, Clydesdale, Worcester.

Continental distribution: Sweden, Germany.

71. NEMATUS DORSATUS.

Vol. I, Pl. IV, fig. 11, Lar.; Vol. II, Pl. XXIII, fig. 3, Saw.

Nematus dorsatus, Cam., E. M. M., xii, 129 (1875).

Reddish-yellow; antennæ slightly fuscous above; base of abdomen above black, the black extending to the middle, becoming narrower as that is reached, and not continuous; extreme apex of sheath black, the sheath itself pale yellow. Antennæ of nearly uniform thickness, a little longer than the abdomen and half the thorax; third joint shorter than fourth. Head narrower than thorax; front faintly punctured; sutures on vertex deep, wide, distinct; frontal area clearly defined; below it, above the antennæ, is a deep fovea much longer than wide; front projecting between the antennæ. Clypeus deeply incised; tips of mandibles piceous. Wings hyaline, nervures blackish, costa and stigma luteous; third costal cellule not much wider than long, dilated at apex; third transverse cubital nervure oblique; second cellule long, not much shorter than fourth. Abdomen considerably longer than head and thorax together, becoming narrower towards the apex; cerci long. Legs stout; posterior spurs not reaching to middle of metatarsus.

Length 3½ lines.

The vertex at the ocelli is faintly blackish, and there is a black mark on the middle lobe of the mesonotum.

The longish abdomen tapering distinctly towards the apex, readily separates this species from the others of the group. Its body has more the shape of the *Ruficapillus* group, and especially of *N. acuminatus*, but the short ovipositor readily distinguishes it from that species. The clypeus is deeper incised than in *N. cadderensis*, &c.

The larva has a longish cylindrical body; the head is brownish-red, mouth black; eyes situated in a black mark which extends to the vertex. Body to the middle of the sides brownish-red obscured with black, the black tint being deeper on the sides than on the back; lower half of the sides and anal segment reddish-brown. Skin smooth, shining, especially when full-fed; legs reddish-white. It is a rather restless creature, and feeds on birch in June and July, there being probably two broods.

Rare. Bishopton.

XVII. THE GROUP OF RUFICAPILLUS (LUTEUS).

Colour reddish-yellow, the metanotum often, and more rarely the mesonotum, marked with two or three longitudinal black marks. Antennæ luteous, more or less marked with black above, usually shorter than thorax and abdomen. Stigma testaceous, black at the base. Third cubital cellule usually much longer than broad. Clypeus incised. The last abdominal segment is very large, occupying, on the lower side, the apical half of the abdomen, the anterior segments being proportionally reduced; it is also largely developed at the apex above, where it, at the point, has a more or less vertical slope, so that the cerci (which are of unusual length) project as it were from the middle instead of, as usual, from the top of the segment. The saw is very long and narrow; the apex bears generally six or seven sharply truncated divisions, which project on both sides, and have waved cross-bars. At the apex the divisions are waved, and the cross-bars are finely toothed. The sheath is large and broad compared to the breadth of the saw.

The males have the abdomen somewhat keeled on the back, and have, at the apex, a pair of shallow furrows. The genital organs are broader than usual, and project considerably.

The larvæ are flat, usually green, the skin beset with tubercles, and the head marked on the vertex with two black marks. They feed on the flat surface of the leaf, especially of the alder. The eggs are laid in the twigs or young branches.

The very long ovipositor is a character very distinctive of this group, as is also the yellowish stigma, black at the base.

Synopsis of the Species.

1 (2) **Head and thorax entirely black; wings deeply infuscated.** ***Abdominalis.***
2 (1) **Head and thorax for the greater part luteous.**
3 (6) **Mesonotum entirely luteous.**
4 (5) **Abdomen broad, not narrowed from the middle; the dorsum entirely luteous; mouth and tibiæ luteous.** ***Ruficapillus.***
5 (4) **Abdomen distinctly narrowed from the middle; the dorsum marked with black; mouth and tibiæ white.** ***Acuminatus.***
6 (3) **Mesonotum marked with black.**
7 (8) **Head without black on vertex; abdomen with black transverse lines on back.** ***Caledonicus.***
8 (7) **Head marked with black; abdomen entirely luteous.**
9 (10) **Head without black on the vertex; clypeus incised; third cubital cellule much longer than broad.** ***Bilineatus.***
10 (9) **Head black (mouth excepted); clypeus transverse; third cubital cellule not much longer than broad.** ***Antennatus.***

72. NEMATUS ABDOMINALIS.

Vol. I, Pl. VI, fig. 9, Lar.; Vol. II, Pl. XXIII, fig. 7, Saw.; Pl. XXVII, fig. 7, Trophi of Larva.

Tenthredo abdominalis, Panz., F. G., 64, 3 (1799); Latr., H. N., xiii, 131; Fall., Acta Holm., 1808, 115, 54.
Nematus abdominalis, Dbm., Consp., 66; Zett, I. L., 352, 50; Br. and Zad., Schr. Ges. König., xvi, 48, pl. i, f. 5; André, Species, i, 179; Cat., 24,* 186.
— _fuscipennis_, Lep., Mon., 68, 204; F. Fr., 70, 24; Ste., Ill., vii, 31.
— _fumipennis_, Ste., Ill., vii, 35.

Nematus ventralis, Hart., Blattw., 192, 16; Costa, F. N., 15, 63, 7; Evers., Bull. Mosc., xx, 14, 17; Thoms., Hym. Scand., i, 137, 66; Brischke, Beschr., 8, pl. i, f. 6 (lar.); Kalt., Pfl., 320 (lar.).
— *Gravenhorsti*, Gimm., Bull. Mosc., ix, 432.
— *luteus*, var. k. Thoms., Opus., 632, 41.

Deep black, shining, sparsely covered with slight down; the head a little narrower than the thorax; the apex of clypeus, labrum, a spot behind each eye, tegulæ and edge of pronotum, the abdomen except the basal segment, and legs, reddish-yellow. The antennæ are a little shorter than the body, the apical half pale-brown beneath; the third and fourth joints are equal in length. Wings deep blackish; lighter at the apex; the stigma deep reddish-yellow; the basal half black; the third cubital cellule is nearly as long as the second. The coxæ are black at the base.

The ♂ has the last segment scarcely emarginate. Its dorsal surface is either entirely black or only black at the base.

Length 3—3½ lines.

Ab.—*a.* Tegulæ and pronotum totally black.

This common species is readily known from its congeners by the deep black head and thorax, the deep smoky wings with the long third cubital cellule, and yellowish stigma with the basal half black.

The larva has the head shining brownish-yellow, with black eye-spots, and dark-coloured mouth organs. The body is flat, with the segments distinctly separated, the ground colour is yellowish-green, as are also the legs; the back is darker. On each segment are four rows of white tubercles; the segments at their juncture are whitish. When young the head is lighter coloured; and the back dark bluish-green.

The eggs, according to Brischke, are laid on the slender green twigs in a row; they are elliptical, white; and two days after being deposited a black crust forms on the incision made for each egg.

The larvæ lie stretched flat on the underside of the leaves of the alder and devour them between the principal nerves. They are found very commonly during August, September, and October. There seems to be but one brood in Scotland, but possibly there may be two in England, as is the case on the Continent.

The pupa state is passed in the earth, the cocoon being close, thick, elliptical, and, like those of the other species, is covered on the outside with grains of earth.

The imagos appear in June. They are very commonly distributed. Kintail, Clydesdale, Berwickshire, Rannoch, Braemar, Sutherlandshire, near Newcastle (Bold), Manchester, Lastingham, Worcester, Gloucester, Glanville's Wootton, London district.

Its European distribution is very wide. Greenland (Schiödte, Berl. Ent. Zeit., iii, 144), Lapland, Finland, Scandinavia, Holstein, Germany, Bohemia, Holland, France, Italy, Switzerland, Austria, Curland, Casan.

Obs.—The *Tenthredo ventralis*, Panz., which Hartig regarded as this species, is a *Selandria* (cf. Giraud, Verh. z. b. Ges. Wien, vi, 187). Tischbein (Stett. Ent., xxxii, 253) describes and figures a monstrous forewing, the neuration being very irregular.

73. NEMATUS ANTENNATUS.

Pl. XXIV, fig. 4, Saw.

Nematus antennatus, Cam., Ent. M. M., xiv, 58 (1877); André, Species, i, 221; Cat., 24,* 190.

Reddish-luteous; the greater part of the head, the antennæ, the sternum, three large marks (almost confluent) on the mesonotum, the scutellum, and the metanotum black. Wings hyaline; stigma reddish-testaceous, black at the base.

Length 3¼ lines.

This distinct species agrees with *N. bilineatus* in having black marks on the mesonotum, but these are very much larger, occupying nearly the whole surface; the mark on the breast is larger, the pleuræ beneath the wings are marked with black, the thorax generally is not so deeply punctured, the incision in the clypeus is not so deep, the mouth is dirty, not clear white, the stigma is broadly black at the base, and the third cubital cellule is very much shorter, more so, indeed, than in any other species in the group, while the second recurrent nervure is farther removed from the third transverse cubital; the nervures also are darker and the legs not whitish at the base.

The antennæ are not much longer than the abdomen and metathorax; the third and fourth joints are of nearly equal length; the last is pale brown beneath. On the head, the orbits, and the face below the antennæ, are reddish-luteous, the clypeus sordid white; the mandibles dark piceous. Cenchri and blotch large, pale white. There are also two small dots on the apex of the abdomen above, and two larger ones on the fifth segment beneath.

I captured *N. antennatus* either on alder or birch growing at the foot of Ben Clibrich, Sutherlandshire, at the end of June. The ♂ I do not know.

74. NEMATUS BILINEATUS.

Pl. II, fig. 4 ♂; Pl. VIII, fig. 10, Lar.; Pl. XXIV, fig. 3, Saw.

Tenthredo lutea, var., Fabr., S. P., 41, 58.
— *bilineata*, Klug, Wied. Zool. Mag., ii, 86 (1819).
Nematus luteus, Thoms., Opus., 632, 41.
— — var. Cam., Ent. M. M., xii, 130.
— *Klugi*, Thoms., Hym. Scand., i, 136, 65; Cam., l. c.
— *bilineatus*, Br. and Zad., Schr. Ges. König., xvi, 51, pl. iv, fig. 7 (lar.); Cam., E. M. M., xiii, 177; Fauna, 37, 36; André, Species, i, 223; Cat., 24, 189.

The larva was also described by De Geer, Mém., ii, 269, pl. xxxviii, figs. 14, 15.

Reddish-luteous, the abdomen paler, shining, the basal joints of the antennæ above, a spot on the breast, the edges of the metanotum, and two, rarely three, marks on the mesonotum, black. Wings yellowish-hyaline; costa and stigma yellow, the latter rarely black at the base.

The ♂ is entirely luteous, except the black marks on the mesonotum, and the apex of the last ventral segment is widely emarginated.

Length 4—4½ lines.

N. bilineatus can only be readily confounded with *N. ruficapillus*, from which, however, it may be easily known by its larger size, clearer wings, with the stigma rarely black at the base, and the third cubital cellule longer; the face distinctly white below the antennæ, which are not so darkly coloured on the upper surface; the cerci point outwards, while in *ruficapillus* the contrary is the case; the spurs are longer and the markings on the mesonotum form conspicuous marks of distinction.

Ab.—*a.* Mesonotum with three nearly confluent black marks, the vertex black in the middle, and the stigma at base distinctly black.

b. Mesonotum and stigma immaculate.

Scotch specimens are smaller and darker than those from the south, the aberration *a* being the common northern form. The wings are deep black, almost darker than in *N. ruficapillus,* the stigma also is deep black at the base, and the metanotum is entirely black.

The larva is very similar to that of *N. ruficapillus,* and has the same habits and food plant. The head is yellowish with two round brown spots on the vertex. The eye-spots black and the mouth brown. The colour of the body is grass-green throughout, and each segment has three transverse rows of white tubercles, each ending in a white hair; these being found also on the overhanging sides. In size it is slightly larger and broader than the commoner species.

The eggs are laid on the underside of the leaf along the mid rib in two rows. The pupa state is passed in the ground. In this country I believe there is but one generation in the year, which occurs from August to October.

N. bilineàtus is tolerably common, and generally distributed. In Scotland I have taken it in Clydesdale, Strathglass, Glen Feshie, Rannoch, and Sutherlandshire. In England the only precise localities I know of are York (F. G. Binnie) and Worcester (Fletcher).

Its continental distribution is extensive; it is found all over Scandinavia, in Finland to lat. 63°, in the Island of Solowetsch, in the White Sea (Palmén, *teste* Zaddach), Livland, Curland, Germany, Holstein, Silesia.

Obs.—Dahlbom (Clavis, fig. 6) figures a male saw-fly, which he named *N. Klugii*, and which Thomson regarded as *bilineatus*, but this is not the case. It is probably (as Zaddach suggests) the ♂ of *N. salicis*.

75. NEMATUS RUFICAPILLUS.

Pl. X, fig. 6, Lar.; Pl. XXIII, fig. 8, Saw.

Tenthredo ruficapilla, Gmel., Syst. Nat., i, 2668, 138 (1789).
— *lutea*, Fab., S. P., 41, 58 (*excl.* var.), (1804); Panz., F. G., 90, 10; Krit., Revis, 46; Latr., H. N., 132; Fall., Acta, 1808, 176.
Nematus luteus, Oliv., Enc. Méth., viii, 167, 6; Lep., Mon., 70, 212; F. Fr., 73, 32; Dbm., Consp., No. 68; Ste., Ill., vii, 29, 11; Gimm., Bull. Mosc., ix, 443; Hart., Blattw., 195, 21; Evers., Bull. Mosc., xx, 20, 24; Costa, F. N., iii, 19, pl. lxiv, f. 3; Thoms., Hym. Scand., i, 138, 67; Br. and Zad., Schr. Ges. König., xvi, 50, pl. iv, f. 6 (lar.); Cam., E. M. M., xii, 130 (lar.), l. c., xiii, 177; Kalt., Pfl., 619; André, Species, i, 214; Cat., 24,* 186.
— *luteus*, var. c. Thoms., Opus., 634, 41.

Antennæ longer than half the body, thin, filiform, decreasing in thickness towards the apex, the third joint scarcely longer than the fourth, the rest becoming gradually shorter; the colour is black above, luteous beneath. Head narrower than the thorax, smooth, shining, covered with pale pile; the vertex thick, rounded, the front also rounded; the sutures and foveæ distinct, moderately deep; the epistoma convex, distinct. Clypeus deeply notched, the incision oval; the apex of labrum a little narrowed, luteous, the face from below the antennæ pale luteous, moderately produced in front; the mandibles are dark brown, the vertex luteous, the eyes and ocelli black. Thorax luteous, at the sides smooth and shining, pubescent; the pleuræ and apex of scutellum are punctured; there is a black band across the breast. The abdomen is longer than the head and thorax, flattish, broadest in the middle, the apex narrowed, compressed, almost truncate; the cerci are rather long; they point downwards and towards each other; the sheath of the saws very broad and thick; the legs are luteous, the spurs short. Wings a little smoky, clearer at the apex; costa and stigma yellowish, the latter black at the base, the nervures deep black. The first transverse cubital nervure is usually faint; the second cubital cellule is long and has a horny point at its apex; the third is a little more than half the size of the second, straight, scarcely widened at the apex; the fourth is about one-quarter longer than the third; the second recurrent nervure is received in front of second transverse cubital.

The ♂ has the head (except the mouth, which is pale yellow), the back of the thorax, and the two basal segments of the abdomen, black. The last abdominal segment shortly emarginated on the ventral side.

Length 3—4 lines.

Ab.—*a.* Edges of meso- and metanotum and the abdominal segments at the edges black.

The larva has the head obscure greenish-yellow, with a brownish mouth, blackish eye-spots, two brownish-black marks on the vertex, and is covered closely with short hairs. The legs are light green, and are almost hidden by the overhanging folds of the body; the claws are brown. The body is flat, and tapers towards the end; the ground colour is grass-green (not unlike the colour of the alder leaf). On each segment are four transverse wrinkles and two transverse rows of white tubercles, with two single tubercles in front; at the sides the segments project. The back is darker, almost bluish-green; the anal segment greyish. When young the larva is much paler and clearer, and the marks on the vertex are indistinct.

In its habits, food plant, &c., it does not differ from the other larvæ just described. I find the larvæ from July to September. The pupa is glassy-green.

This is the commonest species of the group, and its distribution appears to be coextensive with its food plant, occurring from Thurso to the South of England.

Its Continental distribution is equally wide, being found from Lapland and Finland to France; from Italy to the Ural Mountains.

76. NEMATUS CALEDONICUS.

Pl. XXIV, fig. 2, Saw.

Nematus caledonicus, Cam., Trans. Ent. Soc., 1882, 533.

Reddish-yellow, two longitudinal black marks on mesonotum; dorsum of abdomen with black transverse marks, interrupted in the middle, metanotum with two short black marks at the sides. Wings yellowish. Stigma testaceous, black at the base. Antennæ as long as the abdomen and half the thorax; the third joint shorter than the fourth, but longer than the long diameter of the eye; the four basal joints black above; the third cubital cellule nearly one-fourth shorter than the second; recurrent nervure received close to second transverse cubital.

The spurs reach to near the middle of metatarsus, and are nearly as long as the cerci. Extreme apex of sheath black.

Length 3¾ lines.

Differs from *N. bilineatus* in its longer and clearer coloured antennæ, less sharply incised clypeus, in the lighter tint of the body-coloration, narrower head and abdomen, longer spurs, clearer and more yellowish wings, longer third cubital cellule, by the narrower black lines on mesonotum, and on breast, where the black is much narrower; and by the black marks on abdomen. In the last peculiarity it approaches *N. acuminatus* as it does in body form, but the apex is broader, the body stouter, broader, the mouth and tibiæ are not white, the second and third cubital cellules are longer, the recurrent nervure is received nearer the transverse cubital, and the recurrent nervures in hinder wings are not interstitial.

Cladich, Loch Awe; Kingussie in June.

77. NEMATUS ACUMINATUS.

Pl. II, fig. 5 ♀; Pl. XXIV, fig. 1, Saw.

Nematus luteus, var. e. Thoms., Opus., 633.
— *acuminatus*, Thoms., Hym. Sc., i, 138, 68; Br. and Zad., Schr. Ges. König., xvi, 52, 4; André, Species, i, 216, Cat., 24, 191.

Antennæ shorter than the body by about three-quarters of a line, filiform, tapering towards the apex, the third and fourth joints equal, the rest a little shorter; the colour luteous, with a black line above the whole of the joints, or more usually only above the first two. Head luteous, covered with whitish down, the part below the antennæ and the outer orbits white; clypeus deeply notched; the tips of the mandibles brown; palpi pale; the ocelli black; the clypeus and surrounding parts densely covered with white hair. Thorax luteous, densely covered with close down; the pronotum paler; breast luteous, very smooth and shining; the sides of the mesonotum and the metanotum black; cenchri prominent, white. Abdomen luteous; at the base it is narrower than the metathorax, and thence it gradually decreases in width towards the apex, which is acuminate; the dorsal surface (especially on the basal part) is more or less marked with black; cerci very long; the saws considerably exserted. Legs pale luteous; coxæ, trochanters, and tibiæ whitish. Wings hyaline, faintly yellowish, the costa, stigma, and nervures (except at the apex), yellow. The first transverse cubital nervure is very faint; the second cubital cellule is about a quarter longer than the third; the second recurrent nervure is nearly joined to the second transverse cubital.

The ♂ is unknown.

Length 3½ lines.

Ab.—*a.* Stigma black at the base.
b. Dorsal surface of abdomen without black.
c. Wings (especially posterior) smoky.

From the other British species of this section *N. acuminatus* differs in its narrow, sharply pointed face; in the abdomen being narrowed towards the base, and especially towards the apex; also in the deeper notched clypeus, which is quite white, in the black dorsal stripe on the abdomen, distinctly white tibiæ, long spurs, and the yellowish alar nervures.

N. acuminatus has occurred in Clydesdale, Rannoch, Kingussie, Srathglass, Braemar, and Sutherlandshire, and is tolerably common. The larva feeds on birch, and resembles closely that of *N. dorsatus*, unless I have made some mistake through having at the time confounded *acuminatus* with *dorsatus*.

Continental distribution: Lapland, Sweden, Germany, France.

XVIII. THE GROUP OF SALICIS, PAVIDUS, AND ALBIPENNIS.

Yellow species which have the head above the clypeus black, more or less broadly bordered with yellow round the eyes, the pleuræ and breast entirely black, or both may be yellow as in salicis, or the pleuræ only yellow as in bipartitus; the mesonotum always bears some black, and the abdomen may be marked with black at the base or may be entirely yellow. Stigma rarely black, or fuscous, often yellowish. Clypeus incised. Antennæ *entirely black or black only above. Wings hyaline, or they may be tinged with yellow.*

This section contains some of the commonest species of yellow *Nemati*. From the group of *Betulæ* the species may be known by the incised clypeus; from *Myosotidis* by the abdomen being only black at the base, and by the bright yellow colour; from the group of *Luteus* by the short ovipositor, and from *Croceus* by the greater expansion of black on the thorax, by the brighter yellow colour, and by the black antennæ.

The group contains three sub-groups, which, however, merge closely one into the other, so that it is difficult to clearly differentiate them, while two or three of the species might be as well placed in the *Croceus* section, and the smaller forms run into the gall-making group.

SUB-GROUP OF SALICIS.

Yellow, head and mesonotum more or less black; antennæ longish, black, rarely brownish beneath. Stigma black, costa pale, or fuscous. Clypeus incised, but not deeply nor sharply.

These are the largest and commonest of the yellow *Nemati*, and are not difficult to recognise by the yellow abdomen and blackish stigma.

Synopsis of Species.

1 (6) Antennæ and scutellum black.

2 (3) Head luteous, vertex black, breast luteous. ***Salicis.***

3 (2) Head black, breast black.

4 (5) Mesonotum entirely black, head marked with yellow, hinder tarsi yellow. ***Melanocephalus.***

5 (4) Mesonotum with three marks, scutellum and metanotum black more or less, head not marked with yellow, hinder tarsi black. ***Collinus.***

6 (1) Antennæ, scutellum, and metanotum for the greater part yellow. ***Ribesii.***

78. NEMATUS SALICIS.

Vol. I, Pl. VII, fig. 9, Larva, after Brischke; Vol. II, Pl. XXIV, fig. 5, Saw.

Tenthredo salicis, Lin., S. N., 927; Ratz., Forst., iii, 125, 31, pl. iii, f. 5.
— *capreæ*, Fab., S. P., 40, 52.
Nematus salicis, Lep., F. Fr., pl. 11, f. 3; Mon., 68, 203; Ste., Ill., vii, 31; Htg., Blattw., 194, 20; Brischke, Beschr., 6, pl. 1, f. 2 (lar.); Voll., Tijd. Ent., v, 60—64, pl. 3; Thoms., Opus. Ent., 634, 43; Kalt. Pfl., 573; Br. and Zad., Schr. Ges. König., xvi, pl. 5, f. 12 (lar.), l. c., xxiv, 315; André, Species, i, 220; Cat., 23,* 171.
— *inflatus*, Thoms., Hym. Scand., i, 139, 69.

Luteous; a large mark on the vertex, one across the breast, mesonotum, scutellum, basal half of metanotum, and the antennæ, black. Antennæ a little shorter than the body, moderately thick at base, decreasing considerably in thickness towards the apex; slightly pilose, the third joint a very little shorter than the fourth. Head narrower than the thorax, sparsely covered with short pile, the pentagonal area very distinct, frontal sutures well marked, eyes small, oval, clypeus deeply notched, forehead glabrous, apex of the mandibles piceous; palpi pale yellow. Thorax smooth, shining, shortly pilose; cenchri large, dull white. Abdomen large, inflated, cerci short, sheath black, pilose, slightly exserted. Wings hyaline with a yellowish tinge, the nervures, costa, and stigma black; the costa at the base and the tegulæ yellowish; the third cubital cellule is one-fourth longer than the second, which has a horny dot at its apex; the second recurrent nervure is nearly joined to the second transverse cubital. The posterior tarsi are shorter than the tibiæ, black, the apex of the tibiæ being also of this colour; the spurs are short, and the patellæ are well developed.

The ♂ has the antennæ longer and thinner, the black marks on the head and thorax larger, the posterior tarsi reddish.

Length 5½—6 lines.

Ab.—*a.* Antennæ underneath brown.
b. Breast immaculate.

This well-known insect is readily distinguished by the large inflated yellow abdomen, black mesonotum and vertex, as also by the black costa and stigma, and the nearly interstitial second recurrent nervure.

The larva when fully grown is one inch, if not more, in length. The head is shining black, the body cylindrical, bluish-green, the first three and the anal segments are reddish-brown or orange. On the body are seven rows of shining black points and spots. Between the dorsal and the first side row a pair of black spots lie upon each segment. On the orange segments the black spots are fewer, and are also not so regularly arranged, while there is over the anus a large black spot, the last segment bearing also two short black cerci. The thoracic legs are marked with black, the claws being of the same colour. Generally each body segment has about twenty-three black dots, a dorsal row, then two small points, next a row of four large dots, with a small one between the first and second, then four dots with a small point beneath the first and second; while below them is a rather large oblong mark with two smaller roundish marks on the opposite side, and lastly, there is a longish line on each side over the leg.

The eggs are laid on the underside of the leaf. When young the larvæ live in company on the edge of a leaf, but as they get older become more solitary, only one or two being found together on the same leaf. When feeding they have the after half of the body thrown out into the air, or curled round the leaf. They are found from July to October on the large willows (*Salix alba* and *S. fragilis*). The large double brownish-black cocoon is spun in the earth.

Mesoleius armillatorius, Gr.; *M. sanguinicollis*, Gr.; *M. segmentator*, Holmgr.; *Pimpla scanica*, Gr., and *P. stercorator*, Gr., have been bred from the larvæ.

Apparently it is not a very common species in Britain, and hitherto has only been found in the South of England.

On the Continent it occurs in Sweden, Germany, Holland, France, Italy, Switzerland, Hungary.

79. Nematus melanocephalus.

Pl. XXIV, fig. 6, Saw.

Tenthredo salicis, De Geer, Mém., ii, 259, 14, Tab. 37, f. 12—21 (*nec* L.).
Nematus melanocephalus, Htg., Blattw., 219, 52; Kalt., Pfl., 558, 581; Cam., E. M. M., xii, 128; Br. and Zad., Schr. Ges. König., xvi, pl. 5, f. 13 (lar.), l. c., xxiv, 316; Cam., Fauna, 39; André, Species, i, 108; Cat., 22,* 164.
— ***perspicillaris***, Brischke, Beschr., 7, pl. 1, f. 3 (lar.); Kalt., Pfl., 558; André, Species, i, 218; Cat., 21,* 146; Voll., Tijd. Ent., xxiii, 10, pl. 3 (im. lar.).
— ***salicis***, Thoms., Hym. Scand., i, 141, 70.
— ***betulæ***, Voll., Tijd. Ent., vii, 70, pl. 3.

Reddish-yellowish, the head (with the exception of a spot between the antennæ, one behind them, one behind the eyes, the clypeus and labrum, which are pale testaceous), a spot across the breast, the mesonotum, and a stripe across the luteous scutellum, black. Wings hyaline, the costa luteous, the stigma black. The apex of posterior tibiæ and the tarsi are black.

The ♂ has a large mark on the sternum and the back of the abdomen black; the apical segment of the same has a large fovea and is keeled in the centre according to Thomson, but Vollenhoven states that the abdomen is entirely luteous.

Length 3½—4½ lines.

Melanocephalus is very similar in some respects to *N. salicis;* the antennæ, however, are shorter and thinner, the head is black with the exception of the parts noted in the description, but it is not so thick, nor are the sutures so distinct, the scutellum is luteous with a black streak across (but it may be also entirely black), the abdomen is thinner, flatter, and not so much inflated, its apex being also much narrower.

I have noted the following aberrations:

a. Scutellum entirely black.

b. Antennæ pale brown beneath.

Larva. Head deep black, narrower than the second segment. Legs green, the claws slightly blackish. Body bluish sea-green. On the back, at the end of the second segment, is a row of small black dots going across; behind on each of the following segments are four small dots. On the edge of the back is a row of large and small black dots; below them are eleven large square orange spots close to the spiracles; going through these orange marks is a row of black dots, two being on each of the orange spots; below the latter and touching them is another line of larger black dots. In front of the first leg is a Y-shaped mark, and on each leg is a black side mark on the femur; there is also a large black dot between each pair, while over each of the abdominal legs are two black marks. In all there are four rows of the black marks.

The eggs are deposited on the underside of the leaf. The young larvæ at first eat holes in the epidermis, but as they increase in size they take to feeding along the edge, where two or three range themselves, resting as a rule with the anal segments curled round the leaf; or if they are disturbed, with the same segments thrown out and agitated in the air. When they are very young the markings are scarcely noticeable. The cocoon is double, black, somewhat glazed, and is spun in the ground.

The larvæ are found in late summer and autumn on most of our large willows. I believe there are two generations in the year, at least in England, but I am not sure if there are two in Scotland.

Brischke mentions *Mesoleius segmentator* and *M. latipes*, Brischke, as parasites.

I have seen specimens of this species from Berwickshire (Hardy), York (Binnie), Worcester (Fletcher), Gloucester, Glanville's Wootton (Dale), Devonshire (Parfitt).

On the Continent it is found in Sweden, Germany, Holland, France.

Obs.—Nematus melanocephalus was not known to Hartig, who merely abstracted De Geer's description, and, as he considered that it was not the true *salicis*, he re-named the insect. Thomson, however, considers that De Geer's species was the true Linnean *salicis*, so that on this view the *salicis* of most of the authors required another name. This, however, seems to me to be a very doubtful point, and I have consequently adopted Hartig's name as one about which there can be no doubt, while also the adoption of this designation will cause the least confusion.

80. NEMATUS COLLINUS.

Pl. IV, fig. 5, ♀; Pl. XXIV, fig. 7, Saw.

Nematus collinus, Cam., Trans. Ent. Soc., 1882, 534.

Luteous, the head (mouth excepted), antennæ, the breast, metapleuræ more or less, three longitudinal marks on mesonotum, scutellum, metanotum in centre, apex of posterior tibiæ and tarsi, black; apex of clypeus, labrum, coxæ, trochanters, tibiæ, and the greater part of four anterior metatarsi, white. Wings hyaline, costa testaceous at base, apex fuscous, stigma black; third cubital cellule much longer than broad, and much wider at apex than at base, recurrent nervures in hinder wing received close to each other. Antennæ shorter than thorax and abdomen, stout, tapering at apex, the third joint shorter than fourth. Clypeus slightly and broadly incised. Spurs more than one-third of the length of metatarsus, and a little longer than cerci. Apex of sheath black.

Length 3½—3¾ lines.

Similar to *N. melanocephalus*, but smaller, antennæ if anything longer, the mesonotum not entirely black, third cubital cellule much longer, and narrower at the base compared to width at apex, spurs a little longer and sharper at apex, and the recurrent nervures in hinder wings received closer to each other, clypeus almost transverse, &c. It has a superficial resemblance to *N. ribesii*, but that species is readily separated from it by the pale antennæ and yellowish scutellum and metanotum. The black marks on lateral lobes of metanotum are sometimes united to scutellum, which may be entirely black, or its apex may be luteous, and the metanotum entirely black or only the space around the cenchri. The amount of black on breast and sides also varies.

Rare. On birch in June. Craig Dhu, Kingussie, Cladich, Loch Awe.

81. NEMATUS RIBESII.

Vol. I, Pl. VII, fig. 7, Lar., 7 *a*, Pupa; 7 *b*, Eggs; Vol. II, Pl. II, fig. 8, ♀; Pl. XXV, fig. 1, Saw.; Pl. XXVII, fig. 6, Trophi of Larva.

Tenthredo ribesii, Scop., Ent., 280, 734.
— *salicis*, Fall., Acta Holm., xxix, 118, 60.
Nematus trimaculatus, Lep., Mon., 69, 207.
— *grossulariæ*, Dbm., Clavis, 22.
— *ventricosus*, Htg., Blattw., 196; Voll., Tijd. Ent., ii, 69, pl. 4; l. c., 74, pl. 4, f. 6—9; Tasch., Ent. Gart., 168, f. 43 and 44; Norton, Trans. Am. Ent. Soc., i, 208; von Siebold, Beitr., 106—130; Kessler, Die Lebensgeschichte (von) *Ceutorhynchus sulcicollis* und *Nematus ventricosus* (Cassel, 1866), p. 60.
— *ribesii*, Dbm., S. E. Z., 1848, 178; Thoms., Opus., 634, 43; Hym. Sc., i, 143, 73; Cam., Fauna, 38, 38; André, Species, i, 173, pl. x, f. 6; Cat., 21*; Br. and Zad., Schr. Ges. König., xvi, pl. 11, f. 7 (lar.); l. c., xxiv, 342, 60; Cam., Trans. Ent. Soc., 1880, p. 76.

Luteous; head (mouth excepted, it being pallid testaceous), three large marks on mesonotum, a large mark on breast, more or less of the sides of the pleuræ, black. Legs pallid testaceous, coxæ and trochanters white, apex of posterior tibiæ and the greater part (sometimes the whole) of posterior tarsi black; the anterior at the apex slightly fuscous or black. Apex of sheath black; antennæ black or fuscous above, brownish beneath; sometimes the flagellum is entirely testaceous. Wings hyaline, stigma black, costa testaceous at the base.

The ♂ has the thorax entirely black except the pronotum; the dorsum of abdomen is black, except at apex; the sides and ventral surface luteous. Last abdominal segment expanded into a projecting lobe in the middle, the sides of this being curved slightly inwardly; above there is a broad and blunt keel, the segment in either side of this being somewhat hollowed.

Length 3—4 lines.

A rather variable species, especially in the coloration of the antennæ and mesothorax. The fact, however, that the scutellum and metanotum are never black renders its identification easy. Very rarely specimens are caught with the back of the abdomen black.

The full-fed larva has a shining black head, paler at the mouth, and bears some longish hairs. The body is green, or pallid sea-green, generally darker along the back when the food canal is filled. The first and the second in part and the anal segments from the eleventh are orange. The legs are black above, whitish at the junction of the femora and tibiæ and beneath; claws also black. Claspers pallid green. Over the legs is a large black tubercle; over the claspers a pair of smaller tubercles, bearing two or three hairs. The body is covered with black shining tubercles, each ending in one or more hairs; on the first thoracic segment there are eight in all above that over the leg; on second and third are six on each side. The tubercle over the pedal one is the largest of all. On the abdominal segments there are twelve on each side, exclusive of the pair over the legs; those on the top are arranged in two nearly parallel rows of six each, those below are more irregularly placed, one of them being situated between the large tubercles. On the top of the anal segments is a large black mark, narrowed behind and ending in the cerci, which are black; on either side of the mark at the narrow base are six or seven small black marks. When young the larvæ are green, with black heads, and bear minute black points. At the last moult all the black tubercles are cast off; they then become shining bluish-green, orange behind the head and on the tail; the head is also paler.

The eggs are laid along the veins on the underside of the leaves in which they are but very slightly embedded by means of the saws. Pupa green or yellowish-green, orange on thorax and apex of abdomen.

The larvæ feed on the gooseberry and currant bushes; and are frequently excessively numerous, doing great damage by denuding the bushes of leaves. The young larvæ eat the surface of the leaf at first, then make little holes, and as they get older devour the entire leaf except the main ribs.

The flies appear in May; the larvæ are found in June and July; from these come forth a second brood which devastate the bushes in the autumn. The brownish cocoon is spun in the earth under the bushes.

For destroying these larvæ I believe powdered hellebore is often useful; but perhaps the best plan is to destroy the young larvæ by pressure with the fingers, which are easily found by the little holes which they make in the leaves.

The parasites of the larvæ are:

Cleptes nitidula, F.; *Omalus armatus*, Dbm.; *Limneria argentata*, Gr.; *Mesoleius melanoleucus*, Gr.; *M. armillatorius*, Gr.; *Mesochorus confusus*, Hlmgr.; *M. grossulariæ*, Rtz.; *Tryphon ambiguus*, Gr.; *T. bipunctatus*, Gr.; *T. cephalotes*, Gr.; *T. compressus*, Rtz.; *Cteniscus frigidus; Perilissus limitaris*, Gr.; *Polysphincta ribesii*, Rtz.; *Pygostolus sticticus*, Fab.; and *Degeeria flavicans*, Gour. In America *Hemiteles nemativorus*, Walsh, preys on them.

Universally distributed through Europe; introduced also to North America, where it is spreading.

The species is parthenogenetic. Most of the eggs laid by unfertilised females yield only males; but females are occasionally bred from virgin females.

SUB-GROUP OF PAVIDUS.

Black, the head with a broad luteous circle round the eyes, abdomen and legs luteous, the former with a black quadrate spot at the base. Antennæ longish, pale beneath. Wings hyaline, the stigma testaceous, clypeus incised. The ♂ has the head darker round the eyes, and the dorsum of abdomen bears a black band in the centre.

From the group of *Albipennis* the present one may be known by the darker, more sordid, testaceous stigma, clearer wings, and by the flat unpunctured scutellum, stouter antennæ and legs; from *Myosotidis* by the shorter, thicker antennæ, and by the abdomen having only a small quadrate mark on basal segment, not a broad band down its whole extent. The group of *Betulæ* again may be separated from the present by the truncated clypeus, and blackish stigma.

Synopsis of Species.

1 (2) **Mesopleuræ** (except immediately beneath the wings), mesonotum and scutellum, entirely black. *Pavidus.*
2 (1) **Mesopleuræ** broadly yellow.
3 (4) Clypeus black, scutellum immaculate, mesonotum with a V-shaped yellow mark. V-*flavum* (see Group XV).
4 (3) Clypeus yellow, scutellum with two yellow spots, mesonotum entirely black. *Aurantiacus.*

82. NEMATUS PAVIDUS.

Pl. II, fig. 3, ♀; Pl. X, fig. 1, Lar.; 1 *a*, Eggs; Pl. XXV, fig. 2, Saw.

Nematus pavidus, Lep., F. Fr., pl. 10, f. 6; Mon., 65, 191; Br. and Zad., Schr. Ges. König., xvi, pl. 5, f. 15 (lar.), l. c., xxiv, 321; Cam., Fauna, 38; Tr., Ent. Soc., 1880, 79.
— *ochraceus*, Htg., Blattw., 218, 51.
— *semiorbitalis*, Foer., Verh. Ver. pr. Rhein., xi, 288 pl. 111, f. 8 (wing); Kalt., Pfl., 579.
— *myosotidis*, Brischke, Beschr., 14, pl. iii, f. 4 (lar.).
— *palliatus*, var. c. Thoms., Opus., 635.
— *Wttewaalli*, Voll., Tijd. Ent., v, 65, pl. 4 (imago, larva, &c.).
— *aurantiacus*, Thoms., Hym. Sc., i, 156, 89. For larva: Reaumur, Mém., v, pl. 11, f. 3—6; De Geer, Mém., 11, 257, 13, pl. 37, f. 1—11.
Cryptocampus quadrum, Costa, Fauna di Nap. Tenth., 25, pl. lxv, f. 2 (*teste* Zaddach, l. c., *supra*).

Antennæ nearly as long as the head and abdomen, filiform, black; the third and fourth joints about equal in length, the others becoming gradually shorter. Head black, shining, finely punctured, covered with pale pile; pentagonal area faintly visible, front projecting, clypeus incised; epistoma small; black, the face from below the antennæ, and a broad band surrounding the eyes (except behind)—it being especially broad at the apex—luteous; mandibles brownish, palpi testaceous. **Thorax** a little broader than the head, black, shining, finely punctured,

and covered sparsely with greyish pile; the pronotum and mesosternum luteous. Abdomen a little longer than the head and thorax, projecting in the middle, broadly rounded at the apex; the extreme base, a spot on the outside of the blotch (which is very large), black; the saw black at apex, hairy; the cerci are short. Legs yellow, pale white at the coxæ and trochanters, the posterior tarsi a little fuscous and shorter than the tibiæ, spurs a little shorter than the half of the metatarsus; the claws bifid. Wings hyaline, the nervures deep black, costa and stigma sordid luteous; the first transverse cubital nervure is a little faint; the second cubital cellule is double the length of the third, which is a very little dilated at the apex; the second recurrent nervure is received about half the length of the third cellule in front of the second transverse cubital nervure.

The ♂ is coloured like the ♀, except that there is a row of black bands down the back of the abdomen and the antennæ are closely pubescent, compressed, and fuscous beneath. The extent of the black on abdomen varies, and may be absent except at base.

Length 3¼ lines.

Ab.—a. Antennæ fuscous on the underside.

Pavidus is very similar to *N. albipennis*, but differs in the hyaline wings, more sordid costa and stigma, in the second recurrent nervure not being interstitial, the eyes more broadly bordered with luteous, the scutellum smooth and not punctured, &c.

Larva. Head much smaller than the second segment, deep black, the mandibles brown. Legs yellowish-white; spot at the base of the tarsi and the claws black; ventral legs glassy green. Body green, except the second and the last segment, which are orange-yellow. A black line goes down the centre of the back. On each side there are two black lines somewhat broader than the dorsal; below these again is another line of dots arranged thus:—first, a large roundish dot, then two smaller, and then a larger; directly over the legs are two dots, one longish, the other roundish, placed one over the other. There are no marks on the orange-coloured segments.

When young the lines down the back are seen to be composed of dots separated from one another, instead of being continuous. The anal segment also wants the yellow colour, except at the extreme apex, which has a small black spot over it.

The eggs are laid in a cluster on the underside of the leaf. The larvæ feed along its edge, with the hinder part of the body elevated in the air, so as to show the ventral glands, from which exudes a fœtid odour when the creatures are disturbed. They are extremely voracious and frequently do very considerable damage to the various willows upon which they feed, small bushes of *Salix caprea* being sometimes completely denuded of their leaves by these destructive creatures. There are two generations in the year, one in early summer, the other in the autumn. The brownish cocoon is spun in the earth.

It was probably the larvæ of *N. pavidus* that are stated to have done great damage to osiers in England, causing a loss of at least £200 annually, mainly by devouring the leaves, and thus destroying the young plants (Mag. Nat. Hist., vii, 423).

This is a common species in Scotland and probably in England also. The species is parthenogenetic, the eggs laid by the virgin females producing males.

Its parasites are *Mesoleius opticus*, Gr., *Tryphon extirpatorius*, Gr., and *Cteniscus lituratorius*, L.

It is also a native of Sweden, Germany, Holland, France, and Turkey.

83. NEMATUS AURANTIACUS.

Nematus aurantiacus, Htg., Blattw., 197, 25; André, Species, i, 217; Cat., 23,* 176.

Antennæ about the length of head and thorax, covered with close, short pubescence, thin, tapering towards the apex, the third and fourth joints equal, the basal joints entirely black, the middle black, luteous beneath, the apical entirely luteous. Head black, covered with scattered grey pubescence, front projecting, sutures distinct, face, from a little above the insertion of antennæ, pale luteous, mandibles piceous, orbits broadly dark, luteous behind the ocelli; clypeus sharply incised. Thorax luteous, mesonotum and sternum black, sutures of mesonotum and two spots on scutellum luteous; cenchri large, clear white. Abdomen bright luteous, the anal segment a little darker above, apex of sheath fuscous. Wings dark hyaline, costa and stigma luteous, nervures fuscous, yellow at the base of wings; first transverse cubital nervure not clearly indicated; second cubital cellule with a small horny point, third a little narrower at base than at apex; second recurrent nervure received a little in front of cellule. Legs luteous, femora thick, calcaria as long as the cerci.

Length 2¾ lines.

From *N. pavidus*, *aurantiacus* may be distinguished by its having the pleuræ almost entirely luteous, by the sides of the mesonotum being of the same colour, by its more slender body, lighter-coloured antennæ, and generally much longer third cubital cellule. Hartig says that *aurantiacus* has the stigma black at the base, which is not the case with the specimen I have described.

Rare. Glanville's Wootton (Dale).

SUB-GROUP OF ALBIPENNIS.

Orange-yellow, the head and thorax more or less black. Abdomen with one or two black marks in middle of basal segment. Antennæ long and filiform, brownish, lined with black above. Wings hyaline, obscured with yellow or fuscous; stigma yellow. Scutellum gibbous, punctured. Clypeus incised.

A group easily recognised by the orange-yellow colour of the body, yellow stigma, and punctured scutellum. The claws have usually a subapical tooth.

Synopsis of Species.

1 (2) Antennæ entirely black, claws with a subapical tooth, mesothorax entirely black. *Albipennis.*

2 (1) Antennæ reddish beneath and at apex, pleuræ yellow, claws bifid.

3 (4) Tarsi not marked with black, and base of abdomen but rarely, breast with a double black mark in both sexes; mesonotum scarcely punctured. *Bipartitus.*

4 (3) Tarsi annulated with black, mesonotum strongly punctured, breast rarely black in ♀; base of abdomen black. *Xanthogaster.*

84. NEMATUS ALBIPENNIS.

Pl. XXV, fig. 3, Saw.

Nematus albipennis, Htg., Blattw., 196, 22; Thoms., Hym. Scand., i, 88, 8; Opusc., 616, 4; Br. and Zad., Schr. Ges. König., xxiv, 318, 64; André, Species i, 208; Cat., 24;* Cam., Fauna, 38.
— *Drewseni*, Dbm., Consp., 8, 76.
— *confusus*, Foerster, Verh. pr. Rhein., 280.

Black, shining, mouth, pronotum, abdomen, and legs, luteous. Antennæ thickish, tapering towards the apex; the third and fourth joints equal. Head thickish, scarcely narrower than the thorax, black, shining, pentagonal area scarcely visible; fovea between the antennæ large, conspicuous, forehead projecting between the antennæ; eyes oval, lower part of the face covered with long hairs; apex of clypeus, labrum, and palpi (except at the base, where the colour is darker), luteous; mandibles brownish; the apex of the clypeus is broadly notched. Pronotum luteous, meso- and metanotum half shining, black, covered with greyish pubescence; the breast and pleuræ smooth, shining, slightly pubescent; cenchri large, white; scutellum strongly punctured. Abdomen inflated in the centre, apex rounded, bright luteous; cerci small, pale luteous; the blotch large, surrounded with black; saw slightly projecting, black and pilose. Legs luteous, a little whiter at the base; the posterior tarsi with the apex of tibiæ thickened; posterior tarsi shorter than the tibiæ; the spurs less than one-quarter the length of metatarsus; claws toothed. Wings yellowish, clearer at the apex; the costa and stigma luteous; the first transverse cubital nervure is distinct, the third cubital cellule a little more than double the length of the second, which has a horny point near the apex; the second recurrent nervure is almost joined to the second transverse cubital. The tegulæ are luteous.

Length 3—3¼ lines.

The eyes are occasionally surrounded with a yellow border. The ♂ I have never seen. It is stated by Thomson to have the antennæ dilated and compressed at the base, the breast entirely black, and the dorsal lobe of the eighth abdominal segment widely produced in the middle.

The strongly punctured elevated scutellum will readily distinguish this species.

Dours (Cat. 13) adopts the name of *albipennis* for

N. pavidus, Lep., with which it has no connection. The larva is unknown.

The only specimens that I have seen of *albipennis* were taken by Dr. Sharp at Dalry, Galloway.

Continental distribution: Sweden, Germany, Holland, Russia, Italy, Switzerland, Dalmatia.

85. NEMATUS BIPARTITUS.

Pl. XXV, fig. 4, Saw.

Nematus bipartitus, Lep., Mon., 69, 206; Ste., Ill., vii, 32, 21.
— *ochropus*, Thoms., Opus., 617, 6; Hym. Scand., i, 89, 10; Br. and Zad., Schr. Ges. König., xxiv, 321, 66.

Luteous, the antennæ in part, the head except the mouth and a broad band surrounding the eyes (broadest behind), the greater part of the mesothorax, the metathorax in the middle, the pleuræ in part, and the sheath of the saw, black. Antennæ nearly as long as the body, thin, filiform, the third and fourth joints about equal, the remaining joints becoming gradually shorter; the two basal joints are entirely black, the succeeding seven joints are black above, luteous beneath, the last joint being entirely of that colour. Vertex thick, the sutures well marked, the front broadly projecting; scutellum raised, distinctly punctured; mesonotum minutely punctured. Abdomen somewhat inflated in the middle; cerci long, pointing outwardly; sheath of saw projecting, densely covered with longish hairs. Wings hyaline, iridescent, with a faint yellowish tinge, the first transverse cubital nervure is rather indistinct; the third cellule is one-fourth longer than broad, widened at the apex; the second recurrent nervure is received considerably in front of the second transverse cubital; the costa dark testaceous, stigma yellowish-testaceous. The tibiæ are distinctly grooved, the apex of the posterior and the posterior tarsi are marked with black; the calcaria short, scarcely one-fourth the length of the metatarsus; the claws are bifid. ♀ and ♂.

Length 2¾ lines.

Apart from the differences in coloration, *bipartitus* is readily separated from *N. vesicator* by its much longer and thinner spurs, and larger and thinner antennæ. It agrees in its punctured scutellum and coloration with *N. albipennis*, but its antennæ are longer, thinner, and luteous beneath, its body is narrower and more slender, it has less black colour, the second recurrent nervure is not interstitial and the claws are bifid.

I have noticed the following aberrations:

a. Mesonotum with the sutures marked with luteous.
b. Pleuræ immaculate.
c. Base of abdomen black.
d. Tips of posterior tibiæ and tarsi immaculate.
e. Costa and stigma luteous.

A common South of England species.

Continental distribution: Sweden, Germany, France.

86. NEMATUS XANTHOGASTER.

Pl. IX, fig. 8, Larva; 8 *a*, Head; 8 *b*, Leaf eaten by Larva.

Nematus xanthogaster, Foer., Verh. pr. Rheinl., 1854, 315; Kalt., Pfl., 580 (lar.); Cam., P. N. H. S. Glas., ii, 313; l. c., iii, 202; Br. and Zad., Schr. Ges. König., xvi, pl. 6, f. 7; l. c., xxiv, 321; André, Species, i, 224; Cat., 16,* 59.
— *piliserra*, Thoms., Hym. Sc., i, 89, 10.

Reddish-yellow, a large mark on the vertex extending from the end of the frontal area to the back, where it is narrowed, mesonotum, metanotum, and base of abdomen in the middle above (usually the two basal segments), black. Antennæ black or fuscous black above, the apex and lower surface reddish. In the ♂ they are longer and pilose, the third joint is shorter than fourth, and is curved. Apices of posterior tarsal joints distinctly, and anterior slightly, black. Wings hyaline, stigma livid testaceous; costa fuscous. On the breast there is always on the ♂ a broad black mark, or more often two; it is also present occasionally in the ♀. Mesonotum and especially scutellum strongly punctured; claws bifid; the spurs do not reach to the middle of metatarsus.

Length 2¾—3 lines.

In coloration this species resembles closely *N. bipartitus*, but the black on the vertex is much less extended, the mesonotum and scutellum much more strongly punctured; the wings of a clearer hyaline; costa much darker coloured than the stigma, and the tarsi are annulated with black. The sutures of middle lobe of mesonotum are often yellow, the black on base of abdomen may exist only on the basal segment; the sheath is long and densely pilose.

The larvæ live in the more or less rolled-down leaves of *Salix viminalis*, *S. cinerea*, *S. aurita*, &c. The edges are not much rolled down; they eat first the epidermis, then holes in the surface, and latterly may even eat along the edge of the leaf. In colour they are green, lighter along the sides over the legs, of a deeper and bluer tint along the back; the skin is wrinkled transversely, has lighter-coloured spots, and is shortly-haired, the hair on the anal segments being longer. The head is shining, light brownish, irregularly marked with deeper tints on the top; mouth brown. When young they are of a clearer green, the head brown, darker on the top. The cocoon is spun in the earth,

Found in the autumn. Not common. Clydesdale, Worcester, Gloucester.

Sweden, Germany.

XIX. THE GROUP OF RUMICIS AND SCOTASPIS.

Small species of not more than two and a half lines in length, with black bodies; the abdomen more or less yellow, legs reddish-yellow, stigma yellow or whitish-yellow, wings hyaline, or more rarely yellow; antennæ generally entirely black.

This group does not differ much from *N. xanthogaster*, &c., the most conspicuous distinction being that the back of the abdomen is, except very rarely, entirely or almost entirely black. From *N. leucostictus* and *N. vacciniellus* the species are only separable by the reddish-yellow colour of the legs, and by the ventral surface of the abdomen being yellow or reddish.

Synopsis of Species.

1 (2) Wings yellow. *Rumicis.*
2 (1) Wings hyaline.
3 (4) Mesonotum and scutellum punctured, the latter gibbous; stigma pale yellow, the extreme apex fuscous. *Scotaspis.*
4 (3) Scutellum impunctate, stigma not fuscous at apex.
5 (6) Antennæ long, thin; head reddish-yellow, except in centre of vertex. *Arcticus.*
6 (5) Antennæ short, moderately thick, head black, the eyes surrounded with luteous. *Togatus, vesicator.*

87. NEMATUS RUMICIS.

Pl. I, fig. 7, ♂; fig. 8, ♀; Pl. XXV, fig. 5, Saw.

Tenthredo rumicis, Fall., Acta, 1808, 123, 63; Zett., Ins. Lapp., 354, 56.
Nematus xanthopterus, Dbm., Consp., 8, 59.
— *capreæ*, Htg., Blattw., 198, 26.
— *rumicis*, Thoms., Opus., 627, 28; Hym. Scand., i, 119, 45; Br. and Zad., Schr. Ges. König., xvi, pl. 5, f. 11; André, Species, i, 156; Cat., 21,* 149; Br. and Zad., Schr. Ges. König., xxiv, 299, 45.
— *flavipennis*, Cam., E. M. M., xii, 189.

Antennæ longer than the thorax and abdomen, black, bare, almost shining, the third and fourth joints nearly equal; the remaining a little shorter and tapering towards the apex. Head punctured on the vertex, the frontal sutures very distinct, the front strongly projecting; black, the face (including the part between the antennæ) and the eyes (especially behind) broadly surrounded with reddish-yellow; the mandibles deep brown, the clypeus with the apex notched. Thorax black, shining, punctured above, the pronotum edged with obscure yellow-red; cenchri large, white. Legs reddish-yellow, the coxæ partly, and femora broadly at base, more or less marked with black; the last three joints of the posterior tarsi fuscous. Wings ample, strongly iridescent, yellowish; nervures, costa, and stigma reddish-yellow; the second cubital cellule nearly double the length of the third, which is scarcely dilated at the apex; second recurrent nervure received a little in front of the second transverse cubital. Abdomen broad, dilated towards the middle, the apex bluntly pointed; black, smooth, shining, the anal segment and belly in the middle reddish-yellow. The cerci are moderately long, pale yellow, their apices pointing inwardly, saw projecting.

The ♂ is reddish, with the exception of the space surrounding the ocelli, the metanotum, and the greater part of the back of the abdomen which are black; occasionally there are one or two small black marks on the mesothorax, and the scape of the antennæ is usually black.

Length 1¾—2½ lines.

A very variable species, according to Continental authors, but all the specimens I have seen in this country are coloured pretty much as in the description, there being only a slight variation in the quantity of the reddish colour on the head and abdomen. On the Continent the thorax may be reddish, with three or more black marks, or it may be almost entirely reddish; the same variation occurs in the coloration of the abdomen; the legs may be blackish at the base, or wholly reddish-yellow.

The larva, according to Brischke, feeds on *Rumex obtusifolius* in June. The ground colour is grass-green, the back is bluish-green, the dorsal canal is darker and bounded by a row of brownish points. The head is shortly haired, brownish-yellow, with black eye-spots and dark brownish mouth. The ventral legs have frequently over them a brown mark; the claws of the thoracic are brown. The skin is rugged, beset with short tubercles, each ending in a short bristle. At the last moult the larva becomes smooth and shining yellowish-green; the young larvæ are yellow. They eat holes in the leaves, when older devour them along the edge, and sometimes eat the flowers. The thin cocoon is spun in the earth.

It is a tolerably common species, and is very widely distributed. I have taken it in the Glasgow district, Rannoch, Kingussie, Altnaharra, Sutherlandshire, and from England have seen examples from Glanville's Wootton and Devonshire. It is also in Stephens' Collection, but I do not know the precise locality of his specimens.

It is met with in Lapland, Scandinavia, Denmark, Germany, Hungary, France.

88. NEMATUS ARCTICUS.

Pl. XXV, fig. 6, Saw.

Nematus arcticus, Thoms., Hym. Scand., i, 134, 62.

Black, the head and mesonotum finely punctured, semi-opaque, covered with close, short pale pile, the underside of the antennæ, head, except the part immediately surrounding the ocelli, pronotum, tegulæ, upperside of the pleuræ and legs, reddish-yellow; the anus and belly dark testaceous, sternum and pleuræ shining; the coxæ at the extreme base and a spot at the base of femora are black. Antennæ thin, nearly as long as the body, the third and fourth joints being almost equal; clypeus deeply incised, apex of mandibles brownish. The wings are ample, hyaline, strongly iridescent, costa and stigma yellowish-testaceous; the second recurrent nervure is received considerably in front of the transverse cubital one; the third cellule is a little more than half the length of the second, and is very slightly dilated at the apex; the third transverse cubital nervure slopes a little towards the lower outer edge of the wing.

Length 2¼ lines.

The above is the description of one of the two British specimens I have seen of this species. The other has the mesonotum yellowish with three black marks, the black part of the pleuræ with two pale splashes, the anal segment of the abdomen above, the sides and belly entirely yellowish-red. In both the sheath of saw is black, projecting and pilose at the apex.

The only British species with which *arcticus* can be confounded is *N. rumicis*, from which it differs in having the antennæ longer and thinner and not entirely black, the wings likewise wanting the yellowish tinge, while the incision in the clypeus is deeper, the sutures on vertex less distinct, spurs somewhat longer and cerci shorter.

Not common. One specimen taken by Mr. Joseph Chappell in the Manchester district, and another by the Rev. T. A. Marshall, also in England. The only other locality known is Sweden.

89. NEMATUS SCOTASPIS.

Pl. XXVI, fig. 1, Saw.

Nematus pineti, Br. and Zad., Schr. Ges. König., xxiv, 301, T. i, f. 5 (lar.)?
— *scotaspis*, Foer., Verh. pr. Rhein., xi, 307, Tab. v, f. 21.
— *Westermanni*, Thoms., Opus., 615, 3; Hym. Sc., i, 87; André, Species, i, 166.

Black, the space between the antennæ, labrum and clypeus, tegulæ and pronotum white; legs and belly luteous; the second to fourth joints of hinder tarsi fuscous. Antennæ as long as abdomen, filiform, the third and fourth joints subequal; black, reddish underneath and at the apex above; eyes bordered with testaceous behind. Vertex punctured, pentagonal area well defined, deep, clypeus deeply incised. Mesonotum more deeply punctured than the vertex, scutellum gibbous, more deeply punctured than the mesonotum. Femora stout, calcaria a little more than one-third of the length of metatarsus; fifth tarsal joint double the length of second; cerci pale, a little longer than the spurs; claws bifid. Wings hyaline, stigma pallid yellow, darker at apex, costa pale.

The ♂ has the antennæ shorter than the abdomen and thorax, reddish, except at the base above, and the apex of the abdomen is reddish above, sinuated, and with a black broad carina in the middle.

Length 2¼—2¾ lines.

Similar in coloration to *N. vesicator*, but narrower, antennæ shorter, legs stouter, tarsi shorter compared to tibiæ, the fifth joint double the length of second, mesonotum more distinctly punctured, and scutellum more gibbous.

The amount of luteous colour on thorax and abdomen varies considerably. As with *N. rumicis*, Continental specimens are much lighter in colour (often for the greater part fulvous) than British.

If this species be identical with *N. pineti*, Zad. (which I doubt much, for no mention is made of the punctured scutellum, and the ♂ is said to have the antennæ of the length of the whole body), then the larva has been described and figured by Brischke. In habits it agrees with *N. xanthogaster*, in rolling down more or less the edge of the leaves of *Salix alba* and *S. fragilis*. It is bluish-green, darker along the back and white at the junction of the segments. Skin wrinkled, shortly haired. On the two anal segments are a variable number of black spots and points, these segments being deeper, often violet in tint. Cerci short, black. Head shining brown, a darker transverse streak between the eyes; above these the head is darker along the sides. At the last moult the larva becomes brownish-yellow; the single cocoon is spun in the earth or attached to the leaf.

Thomson says of his *N. Westermanni* that it lives in bladder-like galls on willow leaves.

Rare. Among osiers along the Severn, near Gloucester.

Continental distribution: Sweden, Germany.

90. NEMATUS VESICATOR.

Vol. I, Pl. V, fig. 8, Gall; Vol. II, Pl. III, fig. 7, ♀; Pl. XXV, fig. 7, Saw.

Nematus vesicator, Bremi, S. E. Z., 1849, p. 93; Br. and Zad., Schr. Ges. König., xvi, pl. 6, f. 12; l. c., 327, 72; Cam., Fauna, 43, 53; André, Species, i, 161; Cat., 18, 96.
— *helicinis*, Brischke, S. E. Z., 1850, 409; ? Thoms., Hym. Sc., i, 162, 95.
— *lugunensis*, Voll., Tijd. Ent., xiv, 243, pl. lxv, f. 1.
— *crassipes*, Thoms., Hym. Sc., i, 162, 96.

Black, shining, mesonotum punctured; mouth, tegulæ and pronotum pallid-testaceous, orbits of eyes, sometimes the scutellum, the belly and apex of abdomen more or less above, and legs, luteous. Antennæ as long as abdomen, black, reddish beneath, the third and fourth joints equal. Calcaria short, thick, claws bifid. Wings hyaline, costa and stigma pale luteous.

The ♂ has the body darker coloured, and the stigma obscure fuscous.

Length 2¼—2½ lines.

The larva lives in large, oval, or oblong galls on *Salix helix*, *S. purpurea*, and *S. laurina*. They are closely pressed to the midrib, but do not, as a rule, overlap the edge of the blade, but sometimes they are placed so close to the foot-stalk as to project over it.

The walls are thin, and the space inside is larger than in any other gall. As a rule the colour is the same as the leaf, but occasionally the galls are reddish above.

When young the larva is greenish-white, the head black, and claws blackish. Full fed it is slate-coloured, the head fuscous, eyes situated in a dark fuscous splash. The joints of the legs are marked with black, as well as the claws. Brischke figures the larva with a large black mark at the base of the legs, but I did not notice that my larvæ bore such a mark. At the tail the larva is rather attenuated.

The imagos appear in June, the galls in June, July, and August. Rannoch is the only British locality known to me.

Sweden, Germany, Switzerland, France.

91. NEMATUS TOGATUS.

Nematus togatus, Zaddach, Schr. Ges. König., xvi, pl. 111, f. 3; l. c., xxiv, 326, 71.

Black; abdomen (except the two basal segments above and sheath of saw) and legs luteous; labrum, pronotum, and tegulæ pallid yellow. Wings hyaline, costa and stigma yellow; clypeus deeply incised. Orbits of eyes behind more or less luteous. Antennæ not much longer than abdomen, short, thick, covered with microscopic pile; third joint a little shorter than fourth; the underside of the antennæ brownish, especially towards the apex. The sutures on vertex are distinct, deep; pentagonal area large; vertex and mesonotum with scutellum finely punctured; cenchri large. Abdomen not much longer than head and thorax; the first transverse cubital nervure is faint, the second interstitial; third cubital cellule longer than broad; transverse recurrent nervure in hind wing interstitial. The posterior tarsi are more or less blackish or fuscous.

The ♂ has the antennæ longer, stouter, and quite black; the stigma darker; otherwise as in ♀.

Length 2¼ lines.

I am not aware of any satisfactory characters whereby the imago of this species may be known from *N. vesicator*.

The larva is dark (especially on the back) olive green, shining, the skin wrinkled; the head shining black, shortly pilose, lighter coloured at the mouth and in centre of face. Legs marked with black at the base; claws brownish. It feeds on the leaves of the common hazel, eating them along the edge. The cocoon is spun in the earth. Found in September in Scotland, in July in Prussia.

Very rare. Arran.

Prussia is the only continental country from which it has been recorded.

XX. THE GROUP OF GALL MAKERS.

Species of from 1½ to 2½ or 3 lines in length, with black bodies, white legs (entirely white, or the femora may be more or less black); hyaline wings, with white, fuscous, or white and fuscous, stigmata. Clypeus incised.

The preceding section borders so closely on the present that it is impossible to draw any clear line of demarcation between the two. *N. vesicator* is a gall-maker and might be included here; but it is so closely related to non-gall-making species, and as it has the legs, abdomen, and stigma yellow, it is best kept out of the present section, which, as above defined, contains only species with white, or at least testaceous legs, and with the stigma fuscous or white. Some of the species resemble those of the group of *Ruficornis,* and perhaps it might be more natural to place these latter in the vicinity of the present section.

As the third volume of this work deals more particularly with the gallflies, it is unnecessary to enter here into the various theories and facts connected with the origin of galls. It is necessary, however, to point out certain peculiarities wherein sawfly gall-makers differ from the *Cynipidæ.* Unlike what happens with a *Cynips,* the sawfly gall is fully formed before the larva leaves the egg, so it is clear that the larva can have nothing to do in setting the gall-growth in motion; while in the *Cynipidæ* no gall commences to form until such time as the larva quits the egg and commences to feed. The *Cynips* larva again feeds on a particular layer of the gall, namely, that part which immediately surrounds itself and which contains a large quantity of starchy matter; they feed up also very rapidly. The sawfly gall larvæ consume every part of the gall, which does not contain a special layer of nutriment, all the gall (except perhaps the outer skin) affording nourishment. They do not either feed up in a few days like most *Cynipidæ;* they are not, indeed, any more rapid feeders than other larvæ. In their general habits, and mode of forming the cocoon, they do not differ from their congeners which feed openly.

The structure of the sawfly galls is, except in the case of the woody galls of *Euura pentandræ*, very uniform. They are composed of irregular cells, the ordinary cellular structure of the plant profoundly modified. The cells forming the boundary are more regular than those near the centre; they are also smaller and more elongated; and this outer layer (which may be composed of one, two, or three rows of cells), contains few or no stomata. In the case of the gall of *N. gallicola*, the cells adjacent to the epidermal layer are filled with chlorophyl granules, which give to this part a green granular appearance. Near the centre the cells are paler, more irregular, contain apparently less chlorophyl and more intercellular spaces.

When the galls are young the cells are not at all so irregular as they are later on, in fact at first they do not differ much from the ordinary cells of the leaf.

The gall of *Euura pentandræ* is much more complicated in structure. Besides the outer bark layer there is next to it a wide layer of cellular tissue before the layer of woody fibre is reached; this, again, is succeeded by the spongy mass representing the medullary layer, on which the larvæ feed.

Synopsis of Species.

1 (19) Legs testaceous or white, the femora not at all, or scarcely, marked with black.
2 (3) Stigma fuscous, white at extreme base; sutures on vertex and pentagonal area distinct; legs testaceous. *Bellus, cinereæ.*
3 (4) Stigma white, fuscous at apex; sutures and pentagonal area scarcely indicated; legs white. *Albicarpus, gallicola.*
4 (5) Stigma whitish, eyes broadly, and belly more or less, testaceous.
5 (6) Stigma obscure white, belly and anal segment broadly brownish; legs obscure white. *Baccarum.*
6 (5) Stigma clear yellowish-white, anal segment black; legs yellowish-white.
7 (10) Femora reddish-testaceous, upper middle cellule in hind wings shorter than lower.
8 (9) Lower border of stigma fuscous, third cubital cellule one half longer than broad, dilated at apex; spurs curved, reaching to middle of metatarsus; a wedge-shaped testaceous mark between and below the antennæ. *Leucostictus.*
9 (8) Stigma unicolorous, third cubital cellule not much longer than broad, scarcely dilated at apex, spurs almost straight, not reaching to middle of metatarsus. *Vacciniellus.*
10 (13) Apex of coxæ and base and apex of femora whitish-yellow, the rest black; stigma yellowish-white, fuscous on apical border.
11 (12) A wedge-shaped mark between and below the antennæ; eyes broadly bordered with brown; third cubital cellule dilated at apex, upper middle cellule in hind wings longer than lower; antennæ not brownish beneath throughout. *Leucostigma.*
12 (11) Head above clypeus entirely black, eyes not bordered with brown; third cubital cellule not dilated at apex; upper middle cellule in hind wings shorter than lower; flagellum brownish beneath. *Purpureæ.*
13 (16) Coxæ and trochanters entirely black or fuscous, stigma unicolorous, white.
14 (15) Tarsi longer than tibiæ, apical fourth of femora testaceous; terebra as long as half of abdomen. *Herbaceæ.*
15 (14) Tarsi shorter than tibiæ, apical fourth of femora black; terebra shorter than half of abdomen. *Crassispina.*
16 (13) Coxæ at apex and trochanters white, stigma white and fuscous.
17 (20) Pronotum edged with white.
18 (19) Femora testaceous, lined towards the middle with black, spurs reaching to near middle of metatarsus; terebra half the length of abdomen; stigma yellowish-white, fuscous at apex, tarsi slightly fuscous. *Ischnocerus.*
19 (18) Femora black, the extreme apex and the centre white or testaceous; apex of tibiæ and tarsi black.
20 (21) Stigma yellowish-white, infuscated at bottom, head testaceous behind. *Alienatus.*
21 (20) Stigma fuscous, white at base, head black behind, spurs not reaching to middle of metatarsus; base of terebra not reaching to middle of abdomen. *Nigrolineatus.*
22 (17) Pronotum entirely black, stigma fuscous, white at extreme base. *Bridgmani.*

92. NEMATUS LEUCOSTICTUS.

Vol. I, Pl. V, fig. 3, Larva; Vol. II, Pl. III, fig, 6, ♀; Pl. XXVI, fig. 2, Saw.

Nematus leucostictus, Htg., Blattw., 202; Br. and Zad., Schr. Ges. König., xvi, pl. iii, f. 7 (lar.); l. c., xxiv, 165; André, Species, i, 162; Cat., 16,* 58.
— *crassulus*, Dbm., Consp., No. 96; Thoms., Opusc., 630, 37; Hym. Scand., i, 157, 90; Cam., P. N. H. S. Glas., ii, 313 (lar.); Voll., Tijd. Ent., xix, 261, pl. xi, lar., &c.; Br. and Zad., Schr. Ges. König., xxiv, 164, Taf. 111, f. 7 (lar.).
— *Sharpi*, Cam., E. M. M., xii, 191.
— *erythropygus*, Foer., Verh. pr. Rhein., xi, 309, pl. v, f. 23.

Antennæ shorter than the thorax and abdomen, moderately stout, the third joint a little shorter than the fourth; black, the apical joints reddish beneath. Head a little narrower than the thorax, black, vertex and palpi shining, finely punctured. Clypeus deeply notched, white, labrum white, mandibles piceous. Thorax black, shining, almost bare, faintly punctured, pronotum at the base and sides broadly, and tegulæ, white; cenchri small. Abdomen short and broad, a little longer than the head and thorax, the apex abruptly pointed. Cerci short, thin, white, sheath shortly projecting, the apex mucronate, long, and densely pilose. Legs whitish-testaceous, the coxæ black at the base, femora thick, coxæ and trochanters white, the posterior tarsi shorter than tibiæ, the apex of the posterior tibiæ and the tarsi blackish. Wings hyaline, the costa and stigma thick, white, the stigma with a brownish border on the lower side; the third cubital cellule is twice as long as broad, the second recurrent nervure is received about three-fourths the length of the second transverse cubital nervure in front of the same.

The ♂ has the antennæ reddish except at the base, thicker than in the ♀, the greater part of the two apical abdominal segments whitish.

Length 2—2¼ lines.

Ab.—*a.* ♀ and ♂. Eyes surrounded behind with a browish ring.
b. ♀. Posterior tarsi and apex of tibiæ scarcely darkened.
c. ♀. Apical ventral segments pale.
d. ♀. Antennæ entirely black.
e. ♀. Seven apical joints of antennæ brown beneath.

The short thick body, strongly built reddish femora and tarsi, curved spurs, and much longer third cubital cellule, sufficiently distinguish this insect from its allies.

The larva of this species lives in folded-down leaves of *Salix viminalis*, *S. pentandra*, and *S. vitellina*, if not on other willows. The leaf is folded down on the under side, the fold extending, as a rule, the entire length of the leaf. The egg is deposited at one end of the fold embedded in the epidermis; the leaf is bent down by the imago, but how this is done I do not know. I have, however, noticed that the leaf seems to be glued down, as a number of small glutinous shining points are seen along the edge of the fold on the leaf itself, and these dots are especially noticeable when the leaf is young and growing. When the leaf is young the two surfaces of the fold touch one another, but as the larva grows it gets more open, and frequently becomes tenanted by *Aphidæ* as well as by roaming lepidopterous larvæ. Sometimes there is only one fold, but not rarely there will be one on each side of a leaf.

The larva commences feeding by eating the epidermis, at first near where the egg was placed, then in scattered places over the fold, and ultimately over the entire leaf, but the leaf is never devoured quite through. It carries the body somewhat arched, the anus touching the leaf. In the autumn, when it becomes full-fed, it drops to the ground, where it spins a light brown cocoon, in which it remains unchanged till May, when it becomes a greenish pupa, which state lasts from ten to twelve days.

When young the larva is whitish without any very distinct markings. At the third moult the head is flattish, sloping towards the mouth; in breadth it is about the same as the second segment, the colour blackish, fuscous-yellow, or brownish-yellow, with the mouth and eye-spots black. The legs are greenish-white with brown claws, over each is a broad black band; the ventral legs are white. The body is greenish-white, the food canal giving it a darker, often a decidedly green, tint. The skin is beset with many small tubercles, each ending in a short hair; at the sides the segments project in ridges; over the anal segment are two—often only one—broad black bands of a variable size (generally each band is contracted in the middle); the cerci are black. Previous to spinning the head is, as a rule, of a lighter colour, and often there is a distinct black splash on the face; the anal markings are very faint, and the body yellowish-white. The length is from 5—7 lines.

Leucostictus is a tolerably common insect. It is found everywhere in Scotland. I have seen English examples from Manchester, Glanville's Wootton, Gloucester, and the London district.

Continental distribution: Scandinavia, Holland, Germany.

93. NEMATUS LEUCOSTIGMA.

Pl. XVI, fig. 4, Saw.

Nematus leucostigmus, Cam., Proc. N. H. S. Glas., ii, 308 (1876); Fauna, 33, 16; André, Species, i, 133, 26,* 213.
— *politus*, Br. and Zad., Schr. Ges. König., xxiv, 167, 152, Taf. 7, f. 14 (lar.).

Black, the orbits (especially behind) brownish, clypeus, labrum, and a wedge-shaped mark between and below the antennæ, yellowish-white; the tegulæ, the pronotum at the base, and legs, clear white, inclining to yellow, especially on the legs; the coxæ (except at the extreme base) and the greater part of the femora black, the base and apex of femora inclining to fulvous at the junction with the black; the apex of hind tibiæ and tarsi blackish. Wings clear hyaline; costa and stigma white, the latter darker at the apex. In the hind wings the upper middle cellule is shorter than the lower, through the recurrent nervure being received beyond the transverse cubital instead of before it as in *N. leucostictus*. Antennæ black, brownish beneath. Vertex finely punctured. ♀.

Length 2 lines.

A species very closely allied to *N. leucostictus*. The white on the pronotum is much less extended, being confined to the base close to the tegulæ; the third cubital cellule is smaller, not being much broader than long, the costa is of a clearer white, the femora are not reddish, and are more or less lined with black; the upper median cellule is short compared to the lower, the spurs are shorter, and it is also a smaller and narrower species. It is more difficult to separate from *N. vacciniellus*, but that has not the upper middle cellule smaller than the lower; the coloration of the legs is different, it being not so white—almost fulvous—especially on the femora, which are not lined with black; the apex of the abdomen (particularly beneath and at the sides) and the belly in the centre are brownish-testaceous, while in *leucostigma* they are quite black; the stigma is almost unicolorous, the hind tarsi and apex of tibiæ are not fuscous or black, and the abdomen is longer compared to the head and thorax; the clypeus is black at the base, the part of head above it being also black.

The larva, according to Brischke, is bluish-green, the last segments grey, with two short, fine, black cerci, which are joined to a quadrangular black dotted spot; the anal segment at the point is beset with short hairs. Head shining reddish-brown and shortly haired. The eye-spots black, the vertex is stained with a broad dark spot, and between the eyes is a transverse browner one. Mouth brown, claws clear brown.

When young the larva is yellowish. It lives in June and July between the folded-down edges of the leaves of *Salix helix*, feeding on the upper epidermis, thus making brown spaces in the leaf.

Not common. Braemar, Rannoch, Dumfriesshire.

Continental distribution: Germany.

94. NEMATUS VACCINIELLUS.

Nematus crassipes, Thoms., var. *vacciniellus*, Cam., E. M. M., xii, 190 (1876).

— *vacciniellus*, Cam., Fauna, 44, 60; André, Species, i, 134; Cat.

Antennæ shorter than the body, stout, black, very slightly tapering towards the base, the third and fourth joints equal. Head black, finely punctured on the vertex; the sutures and pentagonal area distinct, the mouth (clypeus and labrum) white, and eyes (especially behind) bordered with pale testaceous. Mandibles brown at the tips, clypeus deeply incised. Thorax black, shining, tegulæ white, pronotum broadly edged with white; cenchri pale white. Legs whitish-testaceous, posterior tarsi shorter than tibiæ, the apical joints of the posterior tarsi fuscous; spurs more than one-third of the length of metatarsus; claws bifid. Wings hyaline, the costa and stigma white, nervures pale fuscous; the second recurrent nervure is joined to the second transverse cubital. Abdomen black, mucronate at the apex; the anal segment above and the three apical segments beneath dirty testaceous; the cerci moderately long, white. Terebra short, a little more than one-third of length of abdomen; sheath broad at apex, rounded, covered with long hairs.

The ♂ has the antennæ longer than in the ♀, and they are also pilose; the coxæ and femora are for the greater part black; posterior tarsi black, and the abdomen above is brownish at the junction of the segments. The head is quite black (in the only specimen I have seen) with the mouth pale testaceous.

Length 2 lines.

Similar to *N. baccarum* but larger, stigma of a clearer white, antennæ longer, legs of a decided yellowish hue, and anal segment almost entirely black.

This insect was bred by Mr. C. Healy from galls found by Mr. Eedle on *Vaccinium vitis idœa* at Rannoch.

These are bare, in shape oval, but if anything longer than broad, and slightly compressed laterally. In colour they are dull green, becoming brownish when old, and by the time the larva has become full fed they are reduced to mere thin-walled bladders. In general structure and shape they do not differ from the galls of *N. cinereæ*, and the larva is similar in habits.

95. NEMATUS ALBICARPUS.

Nematus albicarpus, Costa, Fauna, Nap. Tenth., p. 22, pl. lxv, f. 1 (1859); André, Species, i, 134; Cat. 7*; Kirby, List of Hym., i, 138, 264.

Black; labrum and apex of clypeus white; tegulæ, the edge of pronotum, and legs, pallid white; base of coxæ black; apex of tarsi brown. Wings hyaline; nervures brown; stigma whitish-brown at the apex.

Length 1¼ lines.

Unknown to me. "A male. Britain. J. F. Stephens." Kirby, *l. c.*

96. NEMATUS PURPUREÆ.

Nematus purpureæ, Cam., E. M. M., xxi, 80.

Black, covered with close, pale pubescence; labrum, palpi, tegulæ, apical half of coxæ, femora at base and apex, tibiæ and tarsi, whitish-testaceous; flagellum brownish beneath; base of costa and stigma clear white, the rest of costa and stigma at apical half fuscous. Antennæ closely pilose, a little shorter than the thorax and abdomen together, the third joint, if anything, longer than fourth. Clypeus incised. Antennal fovea large, deep, round, shining in the centre; frontal area obsolete; an indistinct fovea below the front ocellus; vertex raised, the lateral sutures broad, there is an indistinct one behind. Head and thorax finely punctured, not very shining, abdomen smooth. The first transverse cubital nervure semi-obsolete; third cubital cellule longer than broad, of nearly equal breadth throughout; second recurrent nervure received a little in front of second transverse cubital. The lower median cellule in hind wings shorter than upper. The femora have a more brownish tinge than the tibiæ or tarsi; the black is not continuous, being absent from the sides, and to a certain extent from the lower portion. Tarsi more or less fuscous above (especially the hinder); cerci testaceous, as long as the hind spurs.

Length 2 lines.

A narrower insect than *N. leucostigma*, and readily known from it by the black clypeus, much larger antennal fovea, darker costa, longer third cubital cellule; by the second recurrent nervure being received much nearer the second transverse cubital, and by the more densely pilose body, which is also less shining. *N. nigrolineatus*, which agrees with it so closely in habits, is a larger insect; its legs are darker coloured, the femora and tarsi being for the greater part black; the stigma has the apical half black; the pronotum is edged with white at the base, and the third cubital cellule is dilated at the apex. In having the flagellum brownish, *N. purpureæ* differs from most of the species.

The larva lives on *Salix purpurea*, the leaves of which are rolled down at the edges like what is done by *N. nigrolineatus* and *Cecidomyia clausila*. It is clear greenish-glassy, rather stout, becoming suddenly attenuate at the anus, and bears no black marks on the hind segments, thus differing from most of the leaf-rolling larvæ. The head is small and shining, clouded with grey, vertex black.

This species was discovered by Mr. J. E. Fletcher near Worcester.

97. NEMATUS NIGROLINEATUS.

Vol. I, Pl. VII, fig. 11, Lar.; Vol. II, Pl. XI, fig. 7, Leaf rolled by Larva; Pl. XXVI, fig. 4, Saw.

Nematus nigrolineatus, Cam., Tr. Ent. Soc., 1879, 109; André, Species, i, 127; Cat., 16,* 61.
Nematus commixtus, Zad., Schr. Ges. König., xxiv, 174.

Black, almost shining; antennæ about a fourth shorter than the body, black, filiform, the third and fourth joints about equal, the rest becoming gradually shorter, and more distinctly separated, and truncated at the apex. Head black; labrum and clypeus white, pilose, clypeus incised; mandibles piceous at the tips; palpi fuscous; vertex finely punctured and covered with depressed pile. Mesonotum semiopaque, finely punctured (more distinctly than the vertex); scutellum shining, almost impunctate; cenchri obscure; pleura smooth, shining; the edge of the pronotum and the cenchri white. Abdomen a little longer than the head and thorax, the apex bluntly pointed; cerci very long, pointing outwardly, saw projecting beyond the cerci, pilose. Legs white; the extreme base of coxæ, the femora, except at base and apex, the apex of the posterior tibiæ and tarsi, the extreme apex of the anterior tibiæ, and the apex of the tarsi, fuscous; calcaria short. Wings hyaline; costa fuscous; stigma large, fuscous at the base, white at the apex; the third cubital cellule is longer than broad; the second recurrent nervure is received considerably in front of the second cubital.

The ♂ is similar in coloration, the antennæ are a little longer, but not much thicker; the underside fuscous, and the third joint shorter than fourth; the stigma fuscous.

Length 2—2½ lines.

This species comes near, in its general coloration, to *N. ischnocerus*, but it is larger and broader, the antennæ are stouter, the femora and tarsi are almost entirely black, the white at the base of the legs is much clearer and the stigma is fuscous, with the base white, the opposite being the case with *N. ischnocerus*; the ♂ has the stigma entirely fuscous, while in the latter it does not differ much from the ♀.

The larva lives in the rolled-down leaves of the osier (*Salix vitellina*), and in coloration, as well as in habits, it agrees closely with *N. leucostictus*. The body is greenish-white, head fuscous on the top, the base pale and spotted with fuscous dots, mouth brownish. Over the legs is a black stripe. The anal segment is marked with two transverse black marks; the first of which is not half the breadth of the second, which is contracted in the middle to near its base; the cerci black, and they are joined to the black transverse lines by a black dot.

The leaf is folded down on the lower side and usually only on one side; the fold is narrow, not being much more than one line in breadth, and extends along the greater part of the leaf.

The imago appears in May and June, the larva in July and August. It is not apparently a very common species. I have it from Clydesdale, Worcester (Fletcher), Gloucester.

98. NEMATUS ISCHNOCERUS.

Vol. I, Pl. V, figs. 5 and 10, Lar.; Vol. II, Pl. XXVI, fig. 3, Saw.

Nematus ischnocerus, Thoms., Opus. Ent., 638, 52; Hym. Sc., i, 159, 91; Zad., Schr. Ges. König., xvi, Taf. 6, f. 10; l. c. xxiv, 169; André, Species, i, 152, pl. x, f. 3; Cat., 18,* 91.
— *femoralis*, (Zad.) Cam., P. N. H. S. Glas., ii, 295; Fauna, 44, 56; André, Species, i, 129; Cat., 17,* 69.

Antennæ a little shorter than the thorax and abdomen; the third and fourth joints nearly, if not quite, equal in length; the third joint slightly curved. Head shining, slightly punctured, black; the clypeus partly, and the labrum, very dark testaceous, in some specimens almost black. Thorax black, shining; tegulæ and the apical angles of the pronotum whitish-testaceous; cenchri large, dull white. Abdomen deep black, the apex almost mucronate and pilose; cerci long and pale testaceous; in some individuals the ventral surface of the abdomen is testaceous in the middle, in others quite black. Legs pale testaceous; the femora, except at the base and apex, and the apex of posterior tibiæ and tarsi, black; the anterior tarsi fuscous. Wings hyaline; the costa and stigma whitish-testaceous, the latter having the apical half fuscous. The third cubital cellule is square or nearly so.

The ♂ has the antennæ longer, thicker, and more pilose; they are also pale beneath. The coxæ and trochanters are black; the anal segment testaceous.

Length 1¾—2 lines.

The larva lives solitarily in galls on *Salix purpurea* and *S. laurina.* The galls are usually in pairs on a leaf, placed opposite to, and almost touching, each other. They project to some extent above, but not at all from the lower side of the leaf. In form they are roundish or oval, sometimes long and narrow, the sides having round projecting rings; the colour on the upper surface is dark purple, reddish-pink, or in some rare instances dark green; beneath it is always pale green. When very young they are of a uniform green colour.

In its habits the larva agrees in the main with that of *N. gallicola*, but it does not make a hole for the expulsion of the frass until a later period than that insect. It devours the gall very closely, and by the time it has become full-fed its habitation is reduced to a bladder, all but the skin having been eaten. I have found galls which had every appearance of being composed of two galls amalgamated, but only one larva could be seen inside. It is also interesting to notice that often on the same leaf two galls may be found, in one of which the larva will be far more advanced in its development than the other. In one instance a larva was still in the egg, whilst the other was in the commencement of the second moult.

When full-fed the larva has the head of a white colour, more or less marked with fuscous above; the eyes are placed in black spots. Mouth brown. The legs are greenish-white; over each of the thoracic pairs is a black band; the claws are black. When the creature is feeding the dorsal vessel is green, the rest of the body being of a dirty-white colour, slightly tinged with green, and covered with a few scattered hairs. The body tapers towards the end, and the segments project much at the sides; the abdominal legs are invisible above and to a certain extent laterally by being hid by the overhanging folds of the body. The head varies in the amount of fuscous with which it is marked.

The galls are found early in June, and by the middle or end of July all the larvæ will have spun their cocoons, which are larger than those of *N. gallicola* and darker in colour. In confinement the larvæ changed to greenish-white pupæ in March and emerged as perfect insects about fourteen days after having changed.

The larvæ are attacked parasitically by a species of *Sciara*, which emerges, either singly or in twos or threes, from the cocoons in February.

The only localities I know of for this species in Britain are Rannoch, Braemar, and New Galloway. It seems to be not uncommon although perhaps rather local.

99. NEMATUS BACCARUM.

Nematus baccarum, Cam., E. M. M., xi, 189 (1876); Fauna, 44, 58; André, Species, i, 160; Cat., 17,* 68.

Antennæ shorter than the body, comparatively thick; black, obscure brown at the tip; the third and fourth joints about equal, the last joint thinner and apparently longer than the eighth. Head black, shining, the vertex finely punctured; the labium and clypeus partly white; mandibles blackish; pentagonal area well defined; sutures on vertex distinct; antennal fovea large, deep, oval. Below and behind the eyes the head is obscure testaceous. Thorax black, shining; mesonotum finely punctured; the pronotum thinly edged with white; tegulæ white. Abdomen obscure black, the anal segment above, and the ventral surface more or less, pale testaceous; the cerci white, projecting outwardly. Sheath of the saw projecting, hairy. Legs white; the coxæ black at the base; the femora at base obscured with fuscous; posterior tarsi longer than the tibiæ and faintly fuscous; spurs more than one-third of the length of metatarsus. Wings hyaline; costa and stigma white, nervures pale; the third cubital cellule is dilated at the apex; second recurrent nervure received about one-fourth of the length of the second cubital cellule in front of the second transverse cubital nervure.

Length scarcely 1½ lines.

The pleuræ and the greater part of the abdomen are obscure black, passing on the ventral side into dull brown; this may, however, be owing to immaturity, the insect having been killed before the colours had become developed.

The small size and white legs will serve to distinguish this little insect from the other gall-makers.

I bred it from a berry-shaped gall of a greyish-green colour, covered closely with fine white hairs, sent me by Dr. White from the neighbourhood of Dunkeld, where it occurred on the leaves of a sallow, probably *Salix aurita*. The larva was white, with the head obscure fuscous, the eye-spots black, the mouth brown, and the segments projected considerably. Previous to pupation I noticed that the end of the body was rather sharply pointed; the colour was dirty white. The larvæ were sent at the end of September, and continued feeding to the end of October, when they spun their cocoons, attached to the bottom of the breeding jar. They did not make a hole for the expulsion of the frass, which is very fine and powdery. Nor, as already remarked, did they, previous to spinning, become of a slate colour, thus differing from the larvæ of the other gall-makers found in berry-shaped galls.

The pupa was white. The imago made its appearance on the 1st May, about fourteen days after becoming a pupa.

100. NEMATUS SALICIS-CINEREÆ.

Vol. I, Pl. V, fig. 7, Gall.

Tenthredo salicis cinereæ, Retz., Degeer, 319; De Vil., Lin. Ent., iii, 113, 89; Degeer, Mém., ii, 1013, 25; Tab. 38, f. 26—31.
— *intercus*, Pz., F. G., Heft 90, pl. xi.
Nematus gallarum, Htg., Blattw., 220, 55.
— *saliceti*, var., Zett., I. L., 351, 49.
— — Foerster, Verh. pr. Rhein., xi, 336.
— *viminalis*, Vol., Tijd., ii, 145, pl. 10; Br. and Zad., Schr. Ges. König., xvi, Taf. 6, f. 11; l. c., xxiv, 345; André, Species, i, 140, pl. x, f. 8; Cat., 17,* 76.
— *æstivus*, Thoms., Opusc., Ent., 638, 51.
— *cinereæ*, Thoms., Hym. Sc., i, 160, 94.
— *Degeeri*, Dufour, Ann. Soc. Ent., Fr., 1847, 583.

Nematus Vollenhoveni, Cam., Sc. Nat., ii, 296; André, Species, i, 153; Cat., 17*, 77.

Black, shining; mouth, tegulæ, edge of pronotum, sometimes the belly and anal segment above, and legs, pale testaceous to pale or bright yellow; the tibiæ paler than the femora; apex of hinder tibiæ and tarsi fuscous. Antennæ a little longer than abdomen, filiform; the third joint a little longer than fourth, apical joints reddish, especially beneath. Wings hyaline; stigma fuscous, pale at the base.

The ♂ has the antennæ longer and thicker, especially at the base, and the stigma fuscous.

Length 2½—3 lines.

A larger insect than *N. gallicola;* the antennæ are shorter, and sutures on vertex and pentagonal area much more distinct; posterior tarsi longer compared to tibiæ, with its second joint shorter compared to fifth, and the stigma has only the extreme base pale.

This species forms galls on *Salix purpurea* and on other smooth-leaved willows. The galls are more or less roundish, pea-shaped, but not unfrequently specimens are found of an elongated form. The skin is smooth and shining; the ground colour is green or yellowish-green, with or without pinkish cheeks. Not unfrequently they have yellowish tubercle-like bodies (apparently fungi) distributed over the surface, and there may be as many as six on a single gall; the internal cavity is considerable, the walls being consequently thin. They are situated on the lower side of the leaf (sometimes, however, projecting a little from the upper) and are always attached to the midrib.

The eggs are deposited in May just as the leaves are beginning to burst forth; and the galls increase in size, as a rule, along with them. The larva when young is rather slender; its body glassy white, except when the contents of the food canal give it a greenish tinge. The head is light fuscous or brown, and is covered with a few hairs; eye-spots deep black; mandibles brown, darker at apices. When full-fed the head is rather small, narrower than the second segment, flattish in front, and is of a grey colour with a tinge of green. Eye-spots black, and a dark irregular spot is placed between the eyes near the top. Mandibles deep brown, palpi white. Legs greyish-white, with brown claws; clypeus lighter in tint. Body attenuate, cylindrical, tapering towards the tail. The colour is shining orange-slate, varying, however, in tint, being sometimes lighter or darker. The segments are well marked; they project in ridges, each being divided into three folds.

The pupa is white with a tinge of green. Cocoon light brownish, of the usual shape, and single.

In the gall the larva rests with the body curved like a J. It does not make a hole for the expulsion of the frass (which is dry, fine, and coffee-brown in colour), so the gall gets pretty well filled with it by the time the larva has become full-fed.

The imago appears in May; the galls are found from the end of May tc the end of September. I have never been able to decide if the species be double brooded or not. Commonly distributed.

Continental distribution: Sweden, Holland, Germany, France, Italy.

101. NEMATUS BELLUS.

Vol. I, Pl. V, fig. 9, Gall.

Nematus bellus, Zaddach, Schr. Ges. König., xxiv, 170, 155.
— *pedunculi*, Cam., Fauna, 43.

This form differs only from the preceding in being a little smaller in size, in having the abdomen at the apex, and the sides and ventral surface pallid yellow inclining to pallid fuscous; the dorsal surface is also of a brownish hue; the clypeus is apparently more deeply incised, and the coloration of the legs is more pallid, not being of such a bright luteous tinge as in *salicis-cinereæ*.

The ♂ possesses the same characters as the ♀, differing from the ♂ of *salicis-cinereæ* precisely in the same respects as its ♀ differs from the ♀ of that species.

Like the last species it varies considerably, some specimens having the abdomen for the greater part black. The head may be entirely black, or the orbits may be broadly bordered with brown. Generally only the clypeus and labrum are pallid yellow, but I have seen one or two specimens with the epistoma yellow. The tarsi may be coloured like the rest of the legs, or may be more or less brownish.

It forms irregular, more or less roundish, oblong, or oval galls on *Salix aurita* and *S. caprea;* they are greenish, often with red cheeks and covered with longish pale hair. I am not aware of any points wherein the larva differs from that of *N. salicis-cinereæ,* and in habits they are identical.

I am not satisfied that this is anything else than a form of *N. salicis-cinereæ.* An examination of long series of both shows that they approximate very closely in all respects, both showing considerable variation in colour and size; there does not seem either to be any tangible difference in the structure of the saws, and I am equally unable to point out any difference between their larvæ. There is no difference in the form of the galls, for although the gall of *bellus* is usually more irregular in shape than that of *salicis-cinereæ,* still the galls of the latter vary also. The fact of the *bellus* galls being hairy is clearly owing to the willow leaves being hairy.

N. baccarum is apparently a distinct species from the above, being easily known by the white legs and stigma, as well as by the larva not changing colour before pupating. At one time (before the description of *bellus* had appeared) I thought that it was identical with *baccarum,* the types of *bellus* I had from Herr Brischke having the stigma very pale and the legs more pallid than in any of the Scotch specimens reared from the hairy pea-shaped galls.

Common.

Continental distribution: Germany.

Obs.—Zaddach (Schr. Ges. König., xxiv, p. 348) considers that the form I described under the name of *N. vollenhoveni,* is probably distinct from his *viminalis.* Further research is, however, needed before this point can be decided.

102. NEMATUS CURTICORNIS, sp. nov.

Pl. XXVI, fig. 6, Saw.

Black, pilose; eyes broadly bordered (especially behind) with brown; mouth, tegulæ, and pronotum broadly white; ventral surface and apex of abdomen and cerci pale testaceous; legs whitish, femora testaceous, bordered above and beneath with black, apical joints of tarsi fuscous-black. Spurs short, thick, not one-third of the length of metatarsus; clypeus deeply incised. Antennæ about the length of the abdomen, stout, slightly compressed, pilose, third joint a little longer than fourth, the apical joints brownish beneath. Wings hyaline, costa pallid testaceous, stigma fuscous, white at the base; first transverse cubital nervure pale, semi-obsolete; third cellule a little longer than broad, wider at apex than at base, second recurrent nervure received a little in front of second transverse cubital; recurrent nervure in hind wings almost interstitial. Front projecting, sutures on vertex deep, pentagonal area not very clearly defined.

Length nearly 3 lines.

It is not very easy to distinguish this species from *N. salicis-cinereæ*. The antennæ are shorter and thicker, the body is broader, stouter, and more pilose; the colour of the tibiæ is a purer white without any trace of testaceous, and the saw is different in shape, as will be seen by a reference to the figures.

Rannoch, in June on willows.

103. NEMATUS GALLICOLA.

Vol. I, Pl. III, fig. 8, Gall; Vol. II, Pl. XXVI, fig. 5, Saw.

***Cynips capreæ*, L. F. Sv. Ed., ii, 1531 (*ex parte*).**
***Nematus gallicola* (West.), Ste. Ill., vii; Cam., Sc. Nat. i, 11, pl. i, Fauna, 44, 57; André, Species, i, 127, pl. x, f. 12; Cat., 17,* 64.**
— *vallisnieri*, Htg., Blattw., 205, 40; Thoms., Hym. Sc., i, 162, 97; Müller, E. M. M., 1870, 109, Br. and Zad., Schr. Ges. König., xvi, Taf. 6, figs. 9, 14 (lar. and gall); l. c., xxiv, 168.
***Pontania vallisnieri*, Costa, F. Nap. Tenth., p. 24, pl. lxv, f. 3.**
Cf. also Swam., Book of Nature, 286, pl. 44; Reaumur, Mém., iii, 435, pl. 37; Roesel., Ins. Belust., ii, pl. 10; Ratz., Forst. Ins., iii, 128, t. iii, f. 26 (*saliceti*).

Black, shining; clypeus, labrum, tegulæ, the pronotum close to the

tegulæ, and legs, whitish-yellow; the greater part of the coxæ, and a more or less longish line on the femora (which have often a reddish tinge), black; the base of posterior tibiæ and the tarsi fuscous. Antennæ a little longer than the abdomen, the apical joints often brownish beneath; pentagonal area and sutures on front obsolete, sutures on vertex short; antennal fovea large, deep. Wings hyaline, costa pale, stigma a little longer than broad, almost quadrate; second transverse nervure often nearly interstitial; upper middle cellule in hind wings smaller than lower.

The ♂ has the antennæ longer, thicker, and more pilose, and the flagellum brownish; the stigma is almost wholly fuscous; the wings are not so clearly hyaline, and the femora bear more black.

Length 1½—2 lines.

A smaller species than *N. salicis-cinereæ*. The legs are whitish, not luteous as in the latter; the frontal area and sutures are obsolete, not distinct as in *salicis-cinereæ*, and the stigma is more largely white, the fuscous predominating in the stigma of *salicis-cinereæ*.

The ♂ is extremely rare, and the species is certainly parthenogenetic, Mr. Fletcher and myself having got virgin females to lay fertile eggs, but neither of us succeeded in rearing any flies from them. Dr. Adler, however, has been more successful, for he managed to get some virgin females to oviposit in June, reared the flies (females) from the galls in July, these again laying eggs which yielded larvæ that spun up in October (Z. wiss. Zool., xxxv, 208).

The larva lives solitarily in galls on various willows, being most abundant on *Salix fragilis*. The galls are bean-shaped, the skin covered with small irregular projections and hairless. In length they vary from a quarter to half an inch, one-eighth to a quarter of an inch in breadth, and about the same in depth, are always placed on the edges of the leaf, and project in about equal proportions through both sides. When young the colour is light green, but as they get older this gives place to a deep red above and a paler red or light green beneath. The number on a single leaf varies from one to thirteen, which latter is the largest number I have noticed. On *Salix alba* they are usually pale green, seldom light red, and hairy on the underside.

On *Salix caprea* they are somewhat oval, dark shining green, glabrous above, very hairy beneath. On *Salix cinerea* they are oblong, dark green, like those on *S. caprea*, but are smaller and more hairy.

The eggs are deposited in May in the leaf-buds, and the galls grow with the leaves. The autumnal broods of course lay the eggs in more mature leaves.

After escaping from the egg the larva is transparent white, with the exception of the head which is very shining and brownish-black. In a short time it assumes a greenish hue on account of the food canal getting filled with food. When full-fed it varies from a quarter to three-eighths of an inch in length. The head is shining brownish-black, with a dark greenish-white semicircle on the face, the mouth light brown, mandibles darker; the body is dull whitish-green throughout, the legs white with brown claws.

The pupa is white.

At first the gall is perfectly solid except in the centre, where there is a small free space surrounding the egg, but through the eating of the larva it becomes in course of time converted into a bladder. On the lower side at one end the larva eats out a round hole, from which it casts out the frass, and occasionally it leaves the gall entirely for a short time. The cocoons are spun as a rule in the earth, but when the larvæ have been on a willow with rough, broken bark, they are spun in the crevices of the bark, under which the old and new ones may sometimes be found packed together in large quantities.

This is undoubtedly the commonest saw-fly in this country, and the most widely distributed.

It is generally distributed over the Continent.

104. Nematus herbaceæ.

Pl. III, fig. 8, ♀; Pl. IX, figs. 3—3*a*, Lar.; 3*b*, Gall;
Pl. XXVI, fig. 7, Saw.

Nematus herbaceæ, Cam., P. N. H. S. Glas., ii, 304—307; Fauna, 44, 59; André, Species, i, 160; Cat., 17,* 68.

Antennæ shorter than the body, moderately stout, covered with close microscopic down, the two basal joints prominent, third and fourth almost equal. Head black, shining, vertex faintly punctured, frontal sutures distinct, antennal fovea deep, one-half longer than broad; covered with short pile; mouth obscure testaceous, covered with longer pilosity than the rest of the head; the tips of mandibles blackish; thorax black, shining, the mesonotum obscurely punctured, and covered with short pile; breast smooth and shining, tegulæ white. Abdomen black, the apex angustate, pilose, anus pale testaceous; saw longer than half the abdomen, its sheath largely projecting and pilose. Legs stout, femora for the greater part black, their apical third, knees, tibiæ, and tarsi, sordid testaceous; the coxæ and trochanters paler than the femora; tips of tarsi fuscous, posterior tarsi equal in length to tibiæ. Wings clear hyaline, costa and stigma sordid white, nervures black; the second recurrent nervure is received a short distance in front of the second cubital.

The ♂ has the antennæ thicker and longer than in the other sex, the tegulæ black, and the stigma slightly darker; the anus pale.

Length 1½—1¾ lines.

Similar to *N. crassispina*, but it has the antennal fovea much more distinct, the incision in clypeus deeper, the femora have less black on them, ovipositor longer, spurs slightly shorter and thicker, and the posterior tarsi are as long as, if not longer than, the tibiæ. It would seem to be very nearly allied to *N. dolichurus*, Thom., and may, indeed, be identical with that species, but in *dolichurus* only the knees are pallid and the abdomen apparently is entirely black. The terebra and cerci are described by Thomson as "longissimis," the former certainly is longer than in any of the other species, but not the cerci, and no mention is made by Thomson of the form of the calcaria in *dolichurus*, these being in *herbaceæ* shorter and thicker than usual, a point which could scarcely have escaped the eye of the distinguished Swede.

This species forms galls on *Salix herbacea.* The gall is roundish, sometimes oval or oblong, smooth, shining, of a green colour, often more or less marked with red. Each gall contains only one larva, and as a rule there is but one gall on a leaf.

The larva has the head fuscous, somewhat darker in front, the eye-spots deep black, the mouth is also black. The legs are dark greenish-white, with darker claws; the ventral legs are the same, but if anything whiter. Over each claw is a small black mark; there is a large (comparatively) irregular mark over each foot (including the ventral ones, except over the anal pair). The body is of a fuscous-white colour throughout; the contents of the food canal give to the back a darker tint, while the skin is covered with small, black, or fuscous-black dots arranged in rows. In all there are five rows of these dots, arranged as follows—one row on the centre of the back, the dots composing it being of a nearly uniform size, as well as being more numerous; in the second row the dots are fewer, there being about three to each segment of the body; the following row has two dots to a segment, one large, the other small; the next is composed of one long dot, and the last row is made up of the above-mentioned marks over the legs. On the second segment the first two dots are of an irregular shape and larger than any of the others, and a little below and in front of them are two smaller dots. The anal segment bears no marks.

This is the only gall-inhabiting larva which bears regularly-arranged marks on the body. It becomes of a slate colour before pupating.

I have found very young galls containing eggs in June, but they are most abundant from the middle of July to the middle of August. The lowest elevation at which I have found the galls would be about 2000 feet, and from that height they extend to near 3800 feet, if not higher. They are rather local in their distribution, showing a partiality for particular spots on a mountain and not spread uniformly over it. Apparently also they vary in numbers during particular years, for some years I have found them abundantly, while in the same spot next year not one could be seen.

In confinement the cocoon is spun either in the gall itself or in the earth. It is of the same form and colour as that of *N. gallicola.* In confinement I bred the flies during February and March.

N. herbaceæ has been found at Allonby in Cumberland by Mr. Inchbald, at Ben Ledi by the same gentleman; they occur also at Rannoch, Braemar, in Bredalbane, and in Sutherlandshire.

105. NEMATUS CRASSISPINA.

Nematus crassispina, Thoms., Hym. Sc. i, 164, 99; André, Species, i, 126; Cat., 17,* 71 (?).

Black; tegulæ, knees, tibiæ, and tarsi obscure white; apex of hinder tibiæ and tarsi obscure fuscous; labrum and mandibles piceous, costa and stigma pale, thick; clypeus slightly incised, antennal fovea shallow, indistinct. Antennæ as long as the abdomen, thick, scarcely attenuated at the apex, the third joint distinctly longer than fourth. Spurs short, thick; hinder tarsi shorter than tibiæ, cerci short, thick, saw scarcely half the length of abdomen, sheath pilose, not projecting beyond apex of abdomen.

Length 1½ lines.

I am not sure if this be the *crassispina* of Thomson. It has the apical third of hinder tibiæ and tarsi fuscous, which is not apparently the case with Thomson's species, but it agrees with it fairly otherwise, including the tarsi being shorter than the tibiæ.

One English specimen without note of locality.

106. NEMATUS ALIENATUS.

Nematus alienatus, Foer., Verh. pr. Rheinl., xi, 334, pl. vii, f. 43; Kirby, List. of Hym., i, 138, 267, pl. vii, f. 13.

— *anglicus*, Cam., E. M. M., xiii, 173.

Black, shining; mouth, tegulæ, legs, and pronotum white, head a little testaceous behind the eyes; femora nearly all black, with a pale band on the under side of posterior; hind tarsi and apex of tibiæ broadly black; posterior tarsi nearly longer than tibiæ. Antennæ nearly as long as the body, thin, third and fourth joints equal; cenchri large, dull white; cerci long, slender, pale, pointing outwardly; terebra long, hairy, projecting; pentagonal area very distinct. Wings hyaline; stigma white, fuscous at base; third cubital cellule nearly square; first transverse cubital nervure distinct.

Length 2 lines.

The antennæ are longer and thinner than in *N. salicis-cinereæ*, the pentagonal area more distinct, the white band on pronotum more conspicuous, and at the same time shorter and thicker. I adopt the name of "*alienatus*" from Mr. Kirby's determination. The species is in Stephens' collection under the name of "*Euura gallæ.*"

107. NEMATUS BRIDGMANII.

Pl. III, fig. 9, ♀; Pl. IX, fig. 1, Gall; 1 *a*, Larva (?); Pl. XXVI, fig. 8, Saw.

Nematus Bridgmanii, Cam., Trans. Ent. Soc., 1883, p. 193.

Black, shining, shortly pilose; labrum, clypeus, tegulæ, apex of coxæ, trochanters in front, more or less of femora, tibiæ and tarsi, white; basal three-fourths of anterior femora broadly lined with black, posterior almost wholly black; apex of posterior tibiæ and tarsi faintly fuscous. Wings hyaline, costa and stigma pallid fuscous, extreme base of latter white. Antennæ a little longer than abdomen, moderately stout, tapering slightly towards the apex, covered with microscopic pile; vertex finely punctured, semi-opaque, sutures distinct; antennal fovea large, clypeus incised at the apex; ovipositor short, not half the length of abdomen, sheath almost glabrous, apex acute, projecting more on upper than on lower side; tarsi shorter than tibiæ; spurs almost straight, more than one-third of the length of metatarsus.

The ♂ has the antennæ longer and thinner, being a little shorter than the thorax and abdomen; it is almost glabrous; stigma fuscous, white at base.

Length nearly 1¾ lines.

In most of the specimens the third joint of the antennæ is longer than the fourth, but in one it is shorter. The third cubital cellule is irregular in shape; in some specimens it is broader than long, in others slightly longer than broad. The species has the greatest resemblance to *N. herbaceæ*, but the darker coloured stigma, much longer ovipositor, more acutely pointed sheath (which is also less hairy), and the femora more strongly marked with black at the apex, readily enable it to be distinguished from the Alpine species. From *N. crassispina* it may be known by the white mouth, longer tarsi and spurs (which are almost straight), longer antennæ, and by the stigma not being unicolorous.

Mr. J. B. Bridgman bred this species from oval green galls found on sallows at Brundall. He sent me a few galls which he thinks are those of the above species, but I have not managed to rear the flies. They do not differ to any appreciable extent from those of *N. gallicola*, on *Salix caprea.*

Genus—EUURA.

Euura, Newman, Ent. Mag., iv, 259 (Jan., 1837).
Cryptocampus, Htg., Blattw., 221.
Nematus, pt. Thoms., Hym. Sc., i, 165.

Antennæ 9-jointed. Wings with one radial and three cubital cellules; the first of the latter small, the second long and receiving both recurrent nervures; lanceolate cellule petiolate; hind wings with two median cellules. Cerci generally longish.

Except in having the second cubital cellule very long, this genus does not differ in any tangible point from *Nematus*. The species have generally the stigma white at the base, and the cerci longish. They are gall makers, forming the galls in the leaf-stalks, in the twigs, or in the leaf-buds. Fourteen European species have been described, and others are also known from North America, and one from Mexico. They are difficult to discriminate, and a revision of the European species is needed.

Synopsis of Species.

1 (4) Edge of pronotum white.
2 (3) Cerci longish, more than four times longer than broad, projecting beyond the apex of abdomen. *Pentandræ.*
3 (2) Cerci short, not much more than four times longer than broad, scarcely projecting beyond the apex of abdomen. *Flavipes.*

4 (1) Pronotum black.
5 (8) Mouth black.
6 (7) Clypeus sharply incised, apex of abdomen and cerci brownish. *Angusta.*
7 (6) Clypeus broadly incised, apex of abdomen and cerci black. *Nigritarsis.*
8 (5) Mouth white.
9 (10) Tegulæ black, cerci black. *Nigritarsis*, var.
10 (9) Tegulæ white.
11 (12) Apex of abdomen and cerci brownish or testaceous. *Saliceti.*
12 (11) Apex of abdomen and cerci black. *Nigritarsis*, var.

1. EUURA PENTANDRÆ.

Pl IV, fig. 9, ♀, 9*a*, Antenna; Pl. VIII, fig. 11, Larva; Pl. XI, fig. 1, Galls, fig. 6, Lar. full-fed.

Cynips amerinæ, Lin., F. Sv. Ed., ii, 1530.
Tenthredo salicis-pentandræ (Retz.), De Geer, Mém., ii, 1009, t. 39, f. 1—11.
— *saliceti*, Zett., Ins. Lap., 351, 49.
Pristiphora duplex, Lep., Mon., 61, 177.
Nematus medullaris, Htg., Blattw., 224, 4.
— *populi*, Htg., l. c., 223, 3.
— *buccatus*, Thoms., Opus., 639, 54.
— *pentandræ*, Thoms., Hym. Sc., i, 165, 100; Dbm., Clavis, 28, 38.
Cryptocampus mucronatus, Voll., Tijd. Ent. (2), vi, pl. 12; Kalt., Pfl., 582.
— *pentandræ*, Cam., E. M. M., xiii, 178; Fauna, 45, 1; André, Species, i, 89; Cat., 10,* 1.

Head a little narrower than the thorax, black, shining, slightly pubescent, smooth, front moderately projecting, vertical sutures distinct; fovea deep; apex of clypeus slightly incised; clypeus in part, labrum, mandibles (apex excepted) and palpi, testaceous-white, the orbits, especially behind, brownish. Antennæ thickish, compressed, the joints distinctly separated, projecting and sharply cut off at apex, covered with stiff pile; black, sometimes brownish beneath, the third and fourth joints equal. Thorax black, shining, covered with fuscous pile; margin of pronotum with tegulæ pale testaceous. Wings hyaline, stigma pale fuscous, white at the base, rarely unicolorous. Abdomen black, a little compressed; anal segment and cerci testaceous. Legs reddish-testaceous, base of coxæ and femora more or less, lined with black at the base; hind tibiæ fuscous at the apex. Claws with a subapical tooth, patellæ small.

The ♂ has the antennæ compressed on the underside and testaceous at apex, with the apex of abdomen and stigma fuscous.

Length 2—2½ lines.

This species forms large woody galls on the shoots of willows, principally *Salix pentandra*. The galls vary in size from that of a pea to a walnut; may be roundish, oval, or very irregular. Several larvæ live in a gall. They are greyish-green, the head brownish, darker on the top. At the last moult they become slate coloured, and spin thin cocoons in the gall.

The galls are formed in June, but the imagos do not make their appearance till the following summer. The species is somewhat local, and often covers a tree with its galls. I have seen willows killed owing to every twig having one or more galls on it.

Pimpla vesicaria, Rtz.; *Limneria multicincta*, Gr.; *Eurytoma salicis*, Thoms.; *E. aciculata*, Rtz., are parasites. Several other *Chalcididæ* and *Oxyura* have also been reported, but they prey rather on the Aphides and other insects which live in the galls.

Local, but widely distributed.

Continental distribution: Sweden, Germany, France, Italy.

2. EUURA FLAVIPES, sp. nov.

Pl. XXVI, fig. 9, Saw.

Black, shining; labrum, mandibles (except at the apex, which is piceous), tegulæ, the edge of pronotum close to them, and legs, whitish-yellow; the base of coxæ black, the femora in the middle, the apex of hind tibiæ and tarsi, fuscous; the ventral surface of the abdomen in the middle, and cerci, whitish. Cerci short, not projecting beyond the apex of the abdomen, not double the length of the posterior spurs. Wings hyaline, apical half of stigma fuscous, basal white.

What I take to be the ♂ has the face from below the antennæ white, the orbits behind brownish, the antennæ have the apex and lower side of the flagellum reddish, the femora have more black and the stigma is fuscous.

Length 2 lines.

The very short (for *Euura*) cerci readily distinguish this species.

Rare: Rannoch, Clydesdale.

3. Euura nigritarsis, sp. nov.

Pl. VIII, fig. 12, Lar., 12*a*, Galls.

Black; the labrum, the mandibles (except at the apex, which is brownish), sometimes the apex of clypeus, the apex of coxæ, base and apex of femora broadly (especially the anterior) and tarsi, yellowish-white; apex of hind tibiæ and tarsi black. Wings hyaline, stigma fuscous or black, the base white. Apex of antennæ brownish beneath.

The ♂ has the flagellum compressed, brownish beneath, closely pilose, and the legs bear more black; the lower inner orbits are whitish, and the white at base of stigma is scarcely visible.

Length 3—3½ lines.

Ab.—*a.* Mouth black.
b. Tegulæ white.
c. Cerci fuscous or brownish.
d. Outer orbits brownish.
e. Clypeus white at apex.

It is a smaller species than *E. angusta*, and may be known from it by its more broadly incised clypeus, and shorter and broader abdomen, which is always black at the apex. *E. læta*, Zad., comes very near to it, but is, I believe, a distinct species, it having the last abdominal segment brownish, the cerci pale, the tegulæ yellow, the margin of the collar being also of this colour. *Læta* also differs somewhat in habits, it forming its galls in the leaf-bud and in the leaf-stalk issuing from it.

The larva of the present species lives in the leaf-buds of *Salix caprea*. These become thereby swollen and a little distorted. Internally they become converted into a green granular matter on which the larva feeds. The greater part of the inside is devoured, and when the larva leaves it the greater part of one side is eaten or at least destroyed to enable the larva to leave the bud. A thin layer of the green substance is left next to the outer scale. Some of the larvæ creep into suitably sized twigs, boring their way into the pith for a little distance, but others drop to the ground. In my breeding cases they preferred pupating in corks rather than in the twigs.

The larva is greenish-yellow, the head darker, especially on the top, mandibles brownish. At the last moult it became slate coloured, as in the other species.

It is certainly destructive to *Salix caprea*. On one large bush I found nearly every bud occupied by a larva, and these certainly would produce no leaves next year. I have often seen branches destroyed by them.

The *Ab. a*, *c* and *d* were all bred together, and I am satisfied that they belong to the same species. *Ab. b* was not reared, but, apart from the white tegulæ, I am not able to find any other points of difference, and in one bred ♂ the tegulæ were greyish.

Common in Clydesdale. The imago in May, the larvæ principally in August, September, and October.

4. EUURA ANGUSTA.

Nematus angustus, Htg., Blattw., 2221; Thoms., Hym. Sc., i, 167, 102.
— *saliceti*, var. c, Thoms., Opus., 639.
Cryptocampus angustus, Voll., Tijd. Ent., xiv, pl. xii; André, Species, i, 86; Cam., Fauna, 45, 3; Kalt., Pfl., 582; Br. and Zad., Beob. ü. Blattw. (2), 13, 13.
— *ater*, Br. and Zad., l. c., 4, 1. ?

Black; antennæ, tegulæ, cerci and mandibles light brownish; knees, tibiæ and tarsi, pallid testaceous; the apex of coxæ, trochanters, base, and apex of femora, and more or less of apex of abdomen, brownish or piceous. Clypeus sharply incised in the middle. Antennæ shorter than the abdomen. Wings hyaline, stigma fuscous, white at the base.

Length 2½—3 lines.

A specimen not distinguishable otherwise from the form described above, has the tegulæ black, which seems to be the only differences between the *C. ater* and

C. angusta of Zaddach. The species compared with *E. nigritarsis* has the abdomen longer in proportion to the head and thorax, the body generally is not so broad, the antennæ are, if anything, shorter and lighter coloured beneath, the legs have a much more testaceous or brownish tinge. The hind tarsi are not black but brownish, the cerci are testaceous, and the anal segment brownish. In one specimen the labrum is piceous.

The imago has been often bred from the twigs of willows, and no doubt the larva is of similar habits to *N. saliceti*, or may form galls in the leaf-stalks like *E. læta*.

Not common, but widely distributed.

Continental distribution: Sweden, Germany, France, Holland.

5. EUURA SALICETI.

Tenthredo saliceti, Fall., Acta, 1808, 111.
Nematus mucronatus, Htg., Blattw., 223, 2.
— *saliceti*, Thoms., Opus., 639, 55; Hym. Sc. i., 167, 101.
Cryptocampus saliceti, André, Species, i, 88; Cam., Fauna, 45, 2.
— *gemmarum*, Br. and Zad., Schr. ges. König., xxiv, Taf. 8. fig. 11 (lar. and gall); Beob. ü. Blattw. (2), 7, 5.

Black; shining, covered with fuscous pubescence; labrum, clypeus, mandibles, the greater part of the space between the antennæ, tegulæ, and legs, whitish-testaceous; more or less of the inner and outer orbits, the apex of abdomen and cerci brownish, base of coxæ, a longer or shorter line on the femora, black; the apex of hind tibiæ and tarsi obscure fuscous or brownish; the greater part of the flagellum reddish beneath, the apex being sometimes entirely of this colour. Wings hyaline; costa and stigma fuscous, the latter white at the base.

The ♂ has the antennæ entirely fuscous (these are also darker in tint than in the ♀); the flagellum is almost wholly red, the white on the oral region is more extended and the femora have more black.

Length 1½—2 lines.

A somewhat variable species. The eyes are sometimes entirely bordered with brown; the femora are not unfrequently almost entirely black; the amount of the white colour on the mouth varies; and often the black on the abdomen has a decidedly brownish or fuscous tinge. I have also seen specimens in which the flagellum of the antennæ had scarcely a trace of brown or red, and others with the tegulæ fuscous. The clypeus may be entirely whitish or only so at the apex. In the ♂ generally the tegulæ are brownish or fuscous. It is the smallest of our species.

The larva lives in the leaf-buds of *Salix aurita*, and in habits scarcely differs from *E. nigritarsis*. The larva is greenish-yellow with a more or less brownish head, fuscous on the top; mandibles brownish. It enters the twig from the bud and penetrates 2 or 3 lines into it for the purpose of passing into a pupa.

Common.

Continental distribution: Sweden, Germany, France.

I have found this autumn, in Cadder Wilderness, near Glasgow, leaves of *Salix caprea* with their leaf-stalks considerably thickened, the swelling extending from the base to the commencement of the leaf. The galls were green like the leaf-stalk itself, but some of the younger ones had a slight reddish tinge in the centre. Each contained a yellowish-green larva, with a more or less fuscous-tinted head, black eye-spots, and brownish mouth. The gall was eaten out almost entirely, and became towards the end filled with brownish frass. The larva left it by making an irregular hole, if it pupated in the ground, but some spun the cocoon inside the leaf-stalk itself.

I hope to rear this species next spring. From the description of the gall and larva I have no doubt that it will prove to be *E. venusta*, Zad. (Beob. ü Blatt. ü Holzw. (2) p. 6).

Obs.—Ed. Newman (Ent. Mag., iv, p. 260) describes two species which he named *E. gallæ* and *E. cynips*, which I am unable to identify from his descriptions. Mr. Kirby (List of Hym., i, p. 151) refers the former to *E. saliceti*, and the latter he gives as a distinct species. It is not likely that either of them is distinct from any of the species I have recorded in the preceding pages.

Jurine (Hym., pl. vi) figures a species of *Euura* under the name of

Pteronus ater, which Hartig doubtfully referred to *angusta*; Mr. Kirby (List of Hym., i, p. 152) inclines to the opinion that it is *pentandræ*, and Kriechbaumer (Mitth. Schw., Ent. Ges., vi, 390) is also of this opinion. The tegulæ and edge of pronotum, however, are quite black, and the length given rather too small for *E. pentandræ*. The *ater* of Zaddach will prove, I think, to be only a var. of *E. angusta*.

APPENDIX TO VOL. I.

SPIRACLES (p. 19).

The third sentence of this paragraph should read as follows: "The second is on the mesothorax close to its junction with the metathorax, the rest are on first (= fourth body segment) to seventh abdominal segments.

PARTHENOGENESIS (p. 25).

Since the publication of my first volume our knowledge of the occurrence of parthenogenesis in saw-flies has been largely increased, and there seems to be no doubt that the phenomenon is quite common. Our additional information may be tabulated as before (see p. 29).

1. Eggs laid by virgin females produced males in *Emphytus cinctus*, L.; *Emphytus viennensis*, Schr. (von Siebold*); *Cladius padi*, (von Siebold and Cameron), *Cl. pectinicornis*, Fourc. (von Siebold); *Cl. viminalis* (von Siebold), *Nematus cadderensis* (Cameron), *N. papillosus*† (von Siebold), *Nem. conjugatus* (von Siebold), *Nematus cæreolocarpus*, Htg. (von Siebold); *Crœsus septentrionalis* (von Siebold and Cameron), *Trichiosoma lucorum* (Cameron), *Abia nitens* (Cameron), *Hylotoma berberidis* (von Siebold), *Hyl. rosæ* (von Siebold), *Lophyrus pini* (von Siebold and Cameron).

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* Cf. Ent. Nachr., x. p. 93–95.

† Probably *N. pavidus*, Lep.

2. Eggs laid by virgin females yielded males and females with *Abia fasciata* (Dr. Osborne* and von Siebold), *Nematus ribesii* (von Siebold and Cameron).

3. Eggs laid by virgin females produced females with *Cimbex connata* (von Siebold "from the virgin females without exception only females were bred," lib. cit., p. 94), *Nematus appendiculatus* (Cameron), *N. conductus* (Cameron), *N. gallicola* (Adler).

4. Eggs were laid by virgin females of the following species, but did not yield imagos. *Blennocampa nigripes* (von Siebold), *Eriocampa limacina* (von Siebold), *Cladius rufipes* (Cameron), *Nematus ruficornis* (Cameron), *Nem. compressicornis* (Cameron), *Trichiosoma sorbi* (von Siebold), *Hylotoma ustulata* (Cameron).

Dr. Osborne* has made some highly interesting experiments and observations on *Abia fasciata.* From larvæ gathered outside Dr. Osborne bred flies which, without any connection with males, laid fertile eggs abundantly which duly hatched and yielded female flies the following year. These again laid eggs parthenogenetically, but much less freely; from these were obtained a third generation of flies which also laid a few eggs, none of which, however, developed.

In this species the males are very rare compared to the females. Thus von Siebold bred only five or six males to hundreds of females from parthenogenetic eggs (Ent. Nachr., x, p. 94). From larvæ collected outside Dr. Osborne obtained 172 females and only one male from 282 cocoons, besides 28 which yielded ichneumons. During the present year he had 270 cocoons spun by larvæ the produce of parthenogenetic females reared in confinement from larvæ collected outside. These only produced 100 living flies, 97 females and 3 males, while he found 32 dead females and 3 dead males, which had perished in the cocoons. From 32 doubly parthenogenetic cocoons Dr. Osborne only obtained 4 living flies, and in the cocoons found 11 more, in all 15 flies, all females. Dr. Osborne had also 9 cocoons produced from presumably fertilised eggs which yielded 5 living and 3 dead ♀ flies, only one larva having perished.

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* E. M. M., xix, 97; xx, 145 and 205; and xxi, 128.

If these observations are normal they show "*first*, there is a smaller number of flies excluded alive from the cocoons; thus, in the 282, 270, and 32 respectively, came out 1 in 2, 1 in 27, and 1 in 8, while in the case of the 9 cocoons from fertilised eggs, more than half excluded flies, and in all but one of the remainder the insects had reached the imago state; *secondly*, there is progressive infertility, flies from fresh larvæ lay eggs abundantly, their descendents much more sparingly, and in the third generation hardly any eggs were produced; *thirdly*, we see a striking increase in the proportion of males in the second generation" (Osborne, E. M. M., xxi, p. 129). No doubt a certain allowance must be made for the artificial conditions under which the larvæ were reared, but generally Dr. Osborne's observations lend support to the views I ventured to enunciate in the first volume (p. 29), viz., that the parthenogenetic progeny have not the same vitality as those which owe their origin to sexual generation.

DOLERUS.

At p. 162, add—

1*a*. DOLERUS PRATORUM.

Tenthredo pratorum, Fall., Acta, 1808, 64, 27.
Tenthredo (*Dolerus*) *equiseti*, Klug., Berl. Mag., viii, 298, 225; Htg., Blattw., 233, 9.
Dolerus pratorum, Thoms., Hym. Sc., i. 281, 5; André, Species, i, 268, Cat. 33*, 7; Brischke, Beob. ü Blattw. u. Holz. (2), 43, 5; Cam., E. M. M., xx, 265.

Black; segments 2—6 of abdomen, femora and tibiæ, red. *Eyes oblong, inner orbits margined*; third joint of antennæ longer than fourth; tegulæ black, fuscous or white; labrum white.

Length 4—4½ lines.

Sometimes the clypeus is white, and in one specimen (a ♂) the flagellum is reddish.

From the two British species with oblong eyes the red-belted abdomen separates it; from the other red-banded species the oblong eyes afford a good distinction, this being the only red-banded species with eyes of this form.

Taken by Mr. Edward Saunders at Chobham. It is not, I believe, a common species, and has been only recorded from Sweden, Germany, and France.

BLENNOCAMPA.

To Synopsis of Species at p. 231, add—

27*a* (27*b*) Hind legs black, except the knees. *Alternipes.*
27*b* (27*a*) „ with the tibiæ broadly white at base. *Subcana.*

BLENNOCAMPA MELANOCEPHALA (p. 245).

As the ♂ of *B. melanocephala* seems to be a puzzle to many entomologists, I give a full description of it here:

Black; abdomen and legs reddish-yellow; sides of abdomen yellow; coxæ clear yellow, lined with black at base and at sides; trochanters clear yellow, black at base and apex; four anterior femora marked with black at the base. The abdominal segments are marked with black transverse lines, and along the sides is a row of black marks. Palpi white. Wings sub-hyaline, large, costa and stigma testaceous. First radial cellule longer than second; second cubital cellule nearly equal in length to the second above, but much shorter on lower side, owing to the third transverse cubital nervure having a very oblique slope; second recurrent nervure nearly interstitial. In the hind wings the recurrent nervures are at the edge of the wing. Antennæ longer than the abdomen, thickish, microscopically pilose. Tegulæ white. Cenchri large, clear white.

Length 3½ lines.

At p. 252, add—

18*a*. BLENNOCAMPA ALTERNIPES.

***Tenthredo (Allantus) alternipes*, Klug, Berl. Mag., viii, 67, 42; Htg., Blattw., 272, 21.**

Blennocampa alternipes, Thoms., Hym. Sc., i, 207, 3; André, Species, i, 310; Cat., 38*, 13; Brischke, Beob. ü Blattw. (2), 80, 31, Taf. v, f. 3, (lar.).

Black, covered with fuscous pubescence, the knees and anterior tibiæ in front, white; cerci testaceous. Wings hyaline, costa and stigma black; transverse radial nervure interstitial; second radial cellule a little longer than first; second cubital cellule longer than the third on the upper side, but shorter on the lower owing to the third transverse cubital nervure having an oblique curve towards the apex, and forming a very sharp angle with the cubital nervure.

Length 3 lines.

I suspect that this is only a form of *B. subcana* with the posterior legs entirely black, for beyond this I have been unable to find other points of distinction. If this view be found correct, Zaddach's name will of course sink.

The larva (*teste* Brischke, *l. c. supra*) feeds on the raspberry in gardens, eating out holes from the undersides of the leaves, and living solitarily. It is from 4—4½ lines in length, somewhat thickened in front, clear green, darker on the back through the food canal, which forms a dark stripe. On each segment stand two transverse rows of white thorns, which, except on the last segment, are cleft at the top, the anal segment having them single. The head is shortly pilose and dark green with a blackish spot on the vertex running from one eye to the other. Between the eyes are two blackish spots; the mouth region darker. At the last moult the larva casts off the spines, and becomes shining green, only the eye-spots being black. The longish cocoon is spun in the earth.

Not common: Loughton, Essex (T. R. Billups).

Continental distribution: Sweden, Germany, France.

HOPLOCAMPA.

To Synopsis of Species at p. 258, add—

6 *a* (6 *b*) Lateral lobes of mesonotum black. *Crataegi.*
6 *b* (6 *a*) Lateral lobes of mesonotum not black. *Plagiata.*

At p. 261, add—

4 *a*. HOPLOCAMPA PLAGIATA.

Tenthredo (*Allantus*) *plagiata*, Klug, Berl. Mag., viii, 56, 22; Htg., Blattw., 278, 40.
Hoplocampa plagiata, André, Species, i, 324; Cat., 41,* 2.

Reddish-yellow; flagellum, metathorax, base of abdomen, apex of hind tibiæ and hind tarsi, blackish. Wings yellowish hyaline, stigma reddish-yellow. The legs are pallid yellow, almost white. Body impunctate, shining.
Length 2½ lines.

Is perhaps only a variety of *crataegi*, as already suggested; it differing from it mainly in the mesonotum bearing no black.

Weybridge (T. R. Billups).
Austria, France.

FENUSA, p. 292.

To Synopsis of Species add—

3 (2) Pronotum white.
3 *a* (3 *b*) Wings sub-hyaline, a broad smoky fascia at stigma; transverse radial nervure not received near third transverse cubital; pleuræ black, femora black. *Quercus.*
3 *b* (3 *a*) Wings sub-hyaline throughout, transverse radial nervure almost interstitial; pleuræ white, femora testaceous. *Hortulana.*

At p. 296 add—

4 *a*. FENUSA QUERCUS, sp. nov.

Black, shining; palpi, tegulæ, pronotum broadly, knees, tibiæ and tarsi, white. Antennæ filiform, as long as the abdomen and metathorax; third joint about one-fourth longer than fourth; the apical joints brownish beneath. Pentagonal area distinct, frontal sutures well marked. Pleuræ pilose. Abdomen scarcely as long as the head and thorax, the apex above pilose, pale; sheath of saw broad, pilose. Wings large; costa pale; stigma fuscous. First radial cellule a little longer than second; transverse radial nervure curved. First cubital cellule considerably longer than second; transverse basal nervure almost interstitial. The hind wings are sub-hyaline, without a fascia. ♀.
Length 2 lines.

In its general structure this species comes near *F.*

hortulana, but that species differs from it markedly in the coloration of the wings and legs. In the coloration of the latter it agrees with *F. pygmæa*, but it is longer than it, has the antennæ longer and more filiform, the pentagonal area and sutures are much more clearly defined, the pronotum is broadly bordered with white, and the wings have a broad, smoky fascia stretching across from the stigma, the wings in *F. pygmæa* being uniformly tinted, except that the apex is lighter; the eyes of the latter, too, being greenish.

This interesting species was discovered by that indefatigable investigator of insect economy, Mr. J. E. Fletcher, mining the leaves of the oak near Worcester, thus being similar in habits to *F. pygmæa*.

ADDITIONS TO VOL. II.

At p. 8, after *Pristis*, add—

Pelmatopus, Htg., Blattw., 244.

CAMPONISCUS.

At p. 22 add—

Synopsis of Species.

1 (2) Tegulæ black, edge of pronotum testaceous, legs ochreo-testaceous, wings infuscated. *Luridiventris.*

2 (1) Tegulæ and edge of pronotum white above and beneath; legs white, black at the base, wings hyaline. *Apicalis.*

At p. 23 add—

2. CAMPONISCUS APICALIS.

Leptopus apicalis, Brischke, Beob. ü Blattw. (2), 18, 4.

Black, shining, covered all over with greyish pubescence; palpi, the tegulæ, the edges of the pronotum above and beneath and legs, white; the greater part of the coxæ, the base of femora black; the apex of hind tibiæ, apex of metatarsus, the greater part of second and the whole of the other joints of the hind tarsi, fuscous; the long pilose cerci and the apex of ninth abdominal segment testaceous. Wings hyaline, costa white, stigma brownish-testaceous. Antennæ long, thin, covered closely with fine pubescence. Clypeus roundly incised, sutures on vertex deep, vertex obscurely punctured; front broadly projecting.

The ♂ according to Brischke has the palpi brownish, the costa brown, stigma darker, the legs black, the knees, tibiæ, and tarsi clear brownish-yellow, the last with darker apices of the joints, the last segment, too, being brownish as in the ♀.

Length 3¼ lines.

Weybridge (T. R. Billups).
Prussia.

Crœsus.

In the Entomological Magazine, iv, p. 261, appears the following note by Mr. Newman: "I have received specimens of a *Crœsus* from Ireland with the body entirely black, with the MS. name of *Crœsus Stephensii*. Mr. Stephens mentions this as a variety, saying it is probably referable to a distinct species. I could wish that so fine an insect, with Mr. Stephens' name attached to it, may prove distinct."

What this may be I know not. Mr. Kirby (List of Hymen., i, p. 103) thinks the locality may be wrong, and that perhaps it may be a North American species, there being two species in the United States with the abdomen black.

ERRATA IN VOL. I.

Page 29, 3rd line from bottom, for *Salicis* read *melanocephalus*.
„ 61, 3rd line from bottom, for *Cœesus* read *Crœsus*.
„ 68, 3rd line from top, *for* three *read* two.
„ 111, 16th line from bottom, for *dorsata* read *dorsalis*.
„ 134, 14th line from top, for *luteifrous* read *luteifrons*.
„ 160, 23rd line from bottom, *for* 19 *read* 26.
„ 165, 16th line from top, for *abietinus* read *abietina*.
„ 190, at top, for *maculus* read *macula*.
„ 231, 21st line from top, *for* (19) *read* (18).
„ 245, for *melanocephalus* read *melanocephala*.
„ 248 and elsewhere, for *eppiphium* read *ephippium*.
„ 283, 5th line from bottom, *for* " fass " *read* " frass."
„ 313, bottom line, for *Scutellariæ* read *Scutellaria*.
„ 320, 15th line from top *for* Zwickan *read* Zwickau.

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PLATE I.

Fig. 1.—*Nematus lucidus* ♂ ; 1 *a*, antenna.

Fig. 2.—*Nematus quercûs* ♀ ; 2 *a*, maxilla ; 2 *b*, labium ; 2 *c*, mandibles.

Fig. 3.—*Nematus imperfectus*. ♀

Fig. 4.—*Nematus glottianus* ♀ ; 4 *a*, antenna.

Fig. 5.—*Nematus cadderensis* ♂ ; 5 *a*, antenna.

Fig. 6.—*Nematus breadalbanensis*. ♀

Fig. 7.—*Nematus rumicis* ♂ ; 7 *a*, antenna.

Fig. 8.—*Nematus rumicis* ♀ ; 8 *a*, antenna.

Fig. 9.—*Nematus appendiculatus*. ♀

Fig. 10.—*Nematus hæmorrhoidalis* maxillary palpus ; 10 *a*, labium.

Phyto Hymen II. Plate I

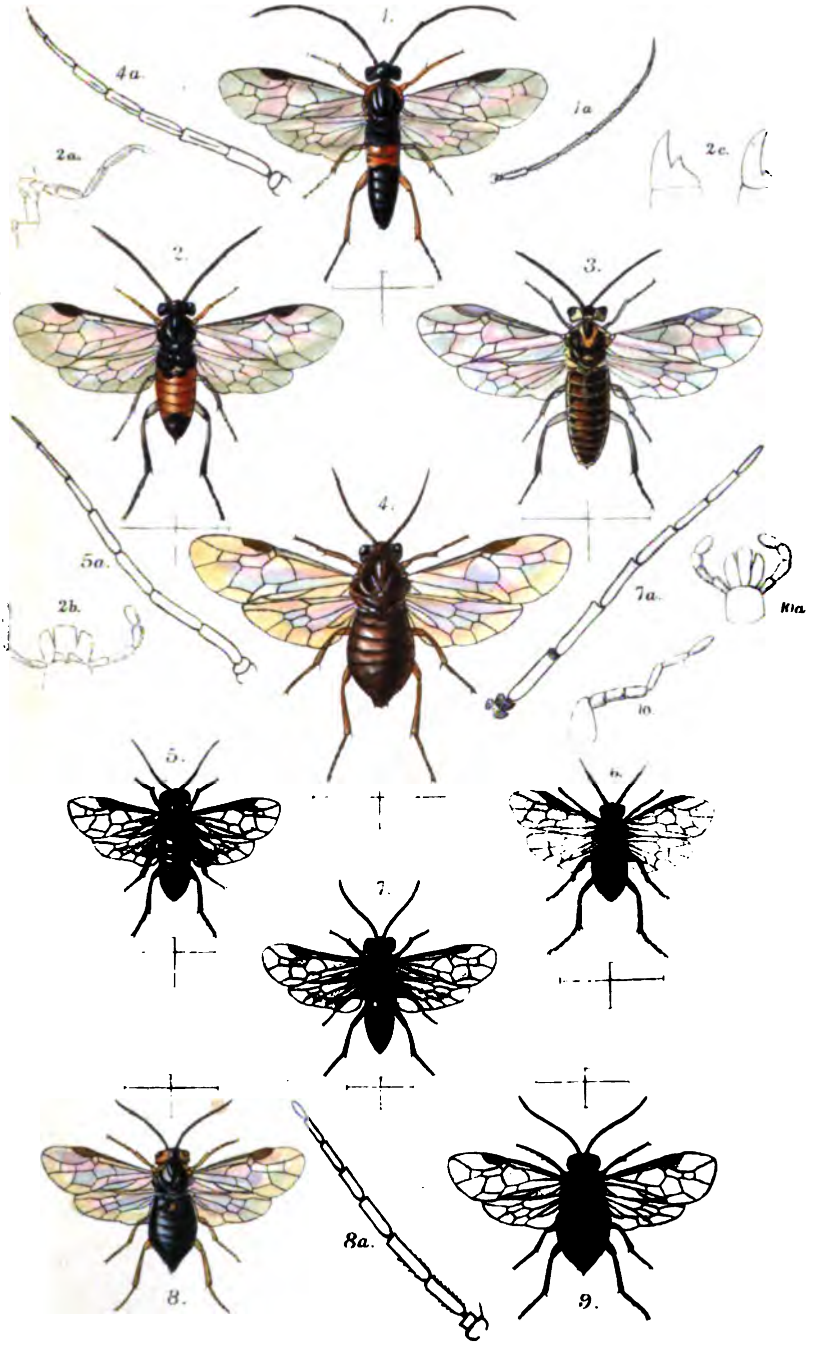
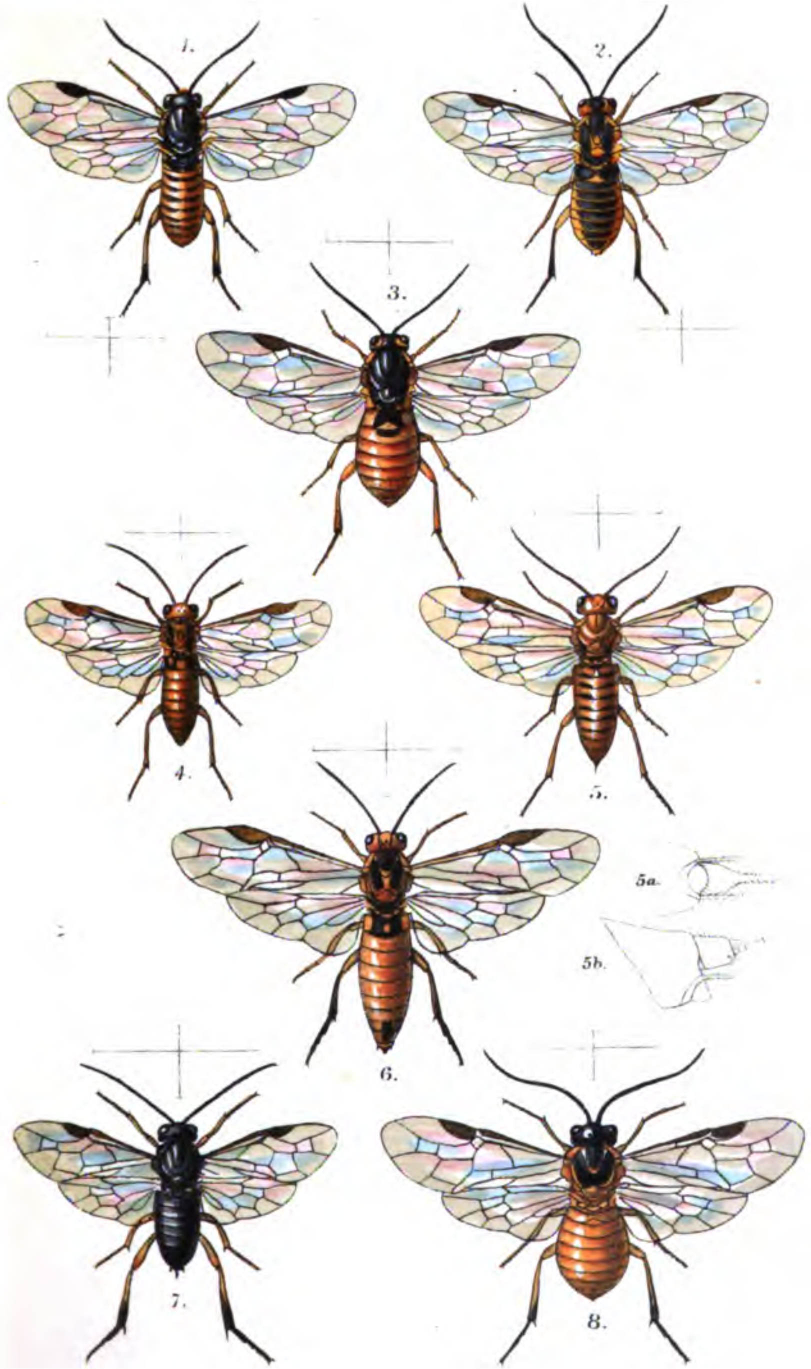


PLATE II.

Fig. 1.—*Nematus pallidiventris.* ♀
Fig. 2.—*Nematus tibialis.* ♀
Fig. 3.—*Nematus pavidus.* ♀
Fig. 4.—*Nematus bilineatus* ♂.
Fig. 5.—*Nematus acuminatus* ♀ ; 5 *a*, apex of abdomen from above; 5 *b*, from the side.
Fig. 6.—*Nematus histrio.* ♀
Fig. 7.—*Nematus cœruleocarpus.* ♀
Fig. 8.—*Nematus ribesii.* ♀

Phyto Hymen ii. Plate 2.



E. Smith del. et lith.

Mintern Bros imp.

PLATE III.

Fig. 1.—*Nematus consobrinus.* ♀
Fig. 2.—*Nematus bipartitus.* ♀
Fig. 3.—*Nematus curtispina.* ♀
Fig. 4.—*Nematus glutinosæ.* ♀
Fig. 5.—*Nematus salicivorus* ♀
Fig. 6.—*Nematus leucostictus.* ♀
Fig. 7.—*Nematus vesicator.* ♀
Fig. 8.—*Nematus herbaceæ* ♀; 8 *a*, apex of abdomen.
Fig. 9.—*Nematus Bridgmanii* ♀; 9 *a*, apex o abdomen.

Phyto. Hymen. ii. Plate 3.

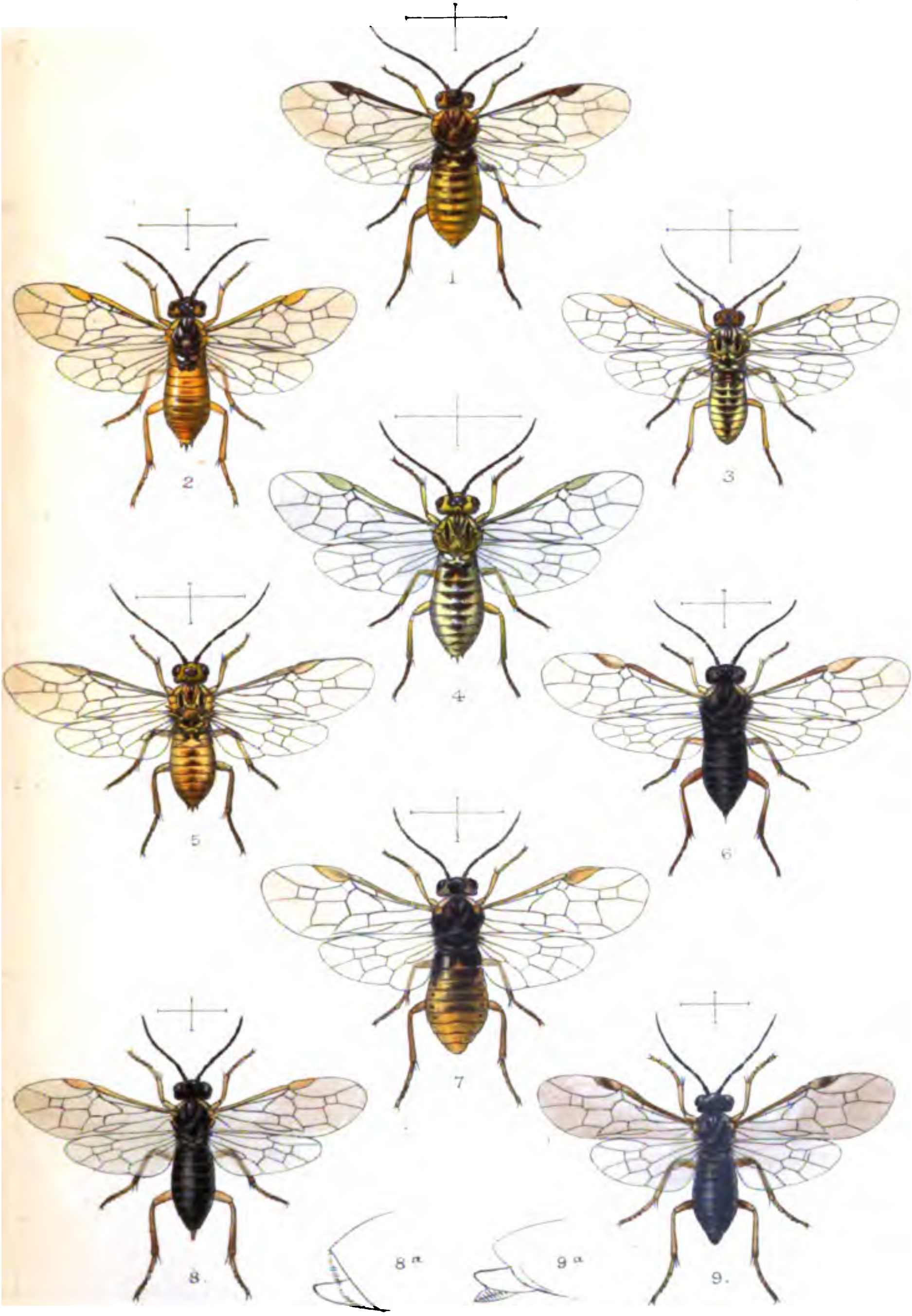


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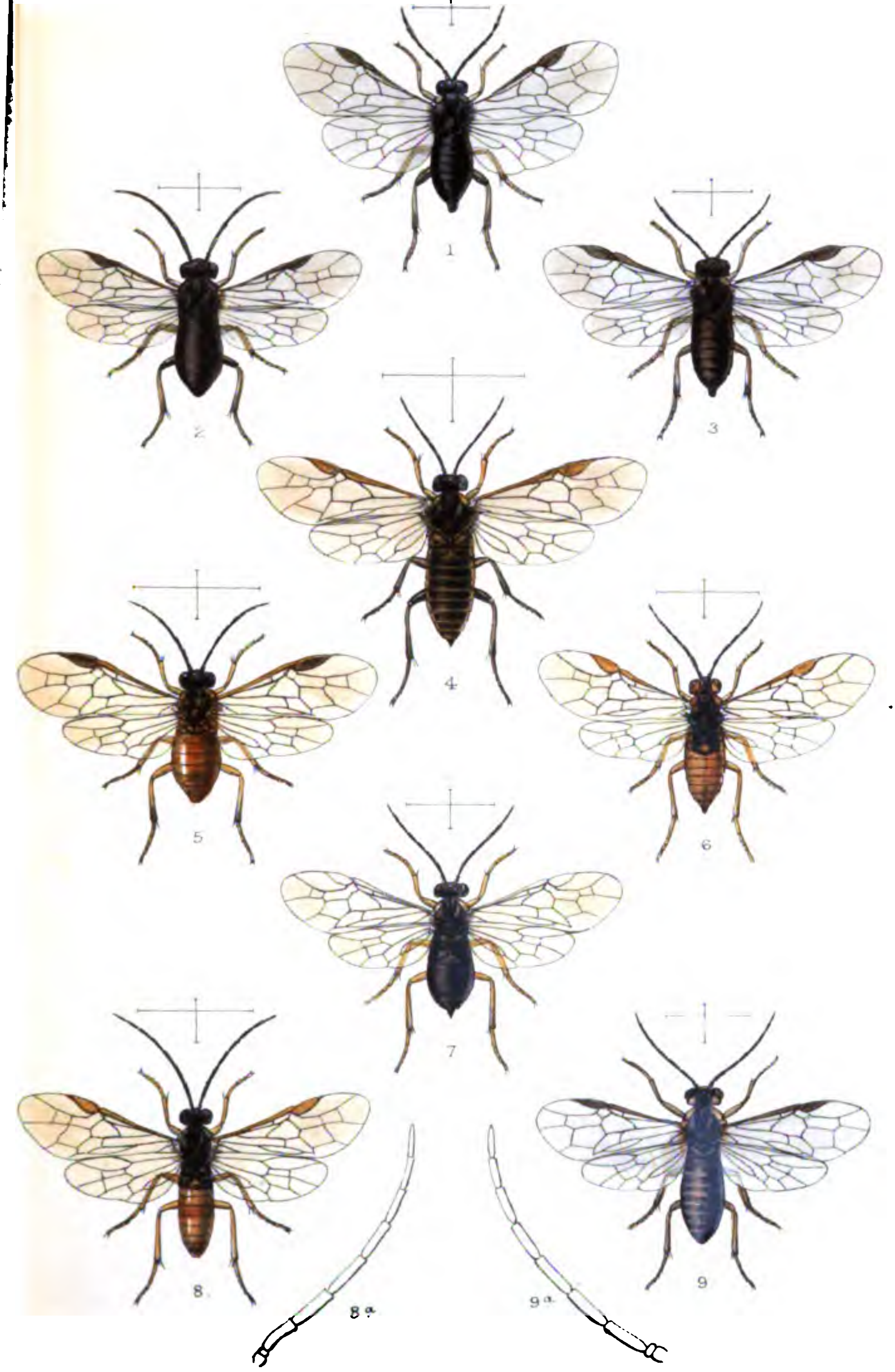
PLATE IV.

Fig. 1.—*Nematus fraternus.* ♀
Fig. 2.—*Nematus Fletcheri.* ♀
Fig. 3.—*Nematus ambiguus.* ♀
Fig. 4.—*Nematus humeralis.* ♀
Fig. 5.—*Nematus collinus.* ♀
Fig. 6.—*Nematus monticola.* ♀
Fig. 7.—*Nematus strongylogaster.* ♀
Fig. 8.—*Nematus capreæ* ♂ ; 8 *a*, **antenna.**
Fig. 9.—*Euura pentandræ* ♀ ; 9 *a*, **antenna.**

Phyto. Hymen. ii. Plate 4.



W. Purkiss lith.

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PLATE V.

Fig. 1.—*Cimbex sylvarum* ♀ ; 1 *a*, head; 1 *b*, antenna; 1 *c*, tarsus.

Fig. 2.—*Trichiosoma Scalesii* ♂ ; 2 *a*, hind leg; 2 *b*, head of ♂ ; 2 *c*, antenna; 2 *d*, maxilla; 2 *e*, labrum; 2 *f*, maxilla of larva; 2 *g*, labium of larva; 2 *h*, mandible of larva.

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Fig. 4.—*Abia fasciata* ♀ ; 4 *a*, ♂ ; 4 *b*, antenna.

Fig. 5.—*Abia nitens*, abdomen of ♂ ; 5 *a*, head of ♂ ; 5 *b*, antenna; 5 *c*, labium; 5 *d*, maxilla; 5 *e*, head of ♀ .

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Fig. 7.—*Hylotoma ustulata* ♀ ; 7 *a*, antenna ♀ ; 7 *b*, labium; 7 *c*, maxilla.

Fig. 8.—Apex of the abdomen of *Hylotoma berberidis*.

Fig. 9.—*Schizocera furcata* ♂ ; 9 *a*, antenna ♀ ; 9 *b*, antenna ♂ .

Phyto. Hymen ii. Plate 5.

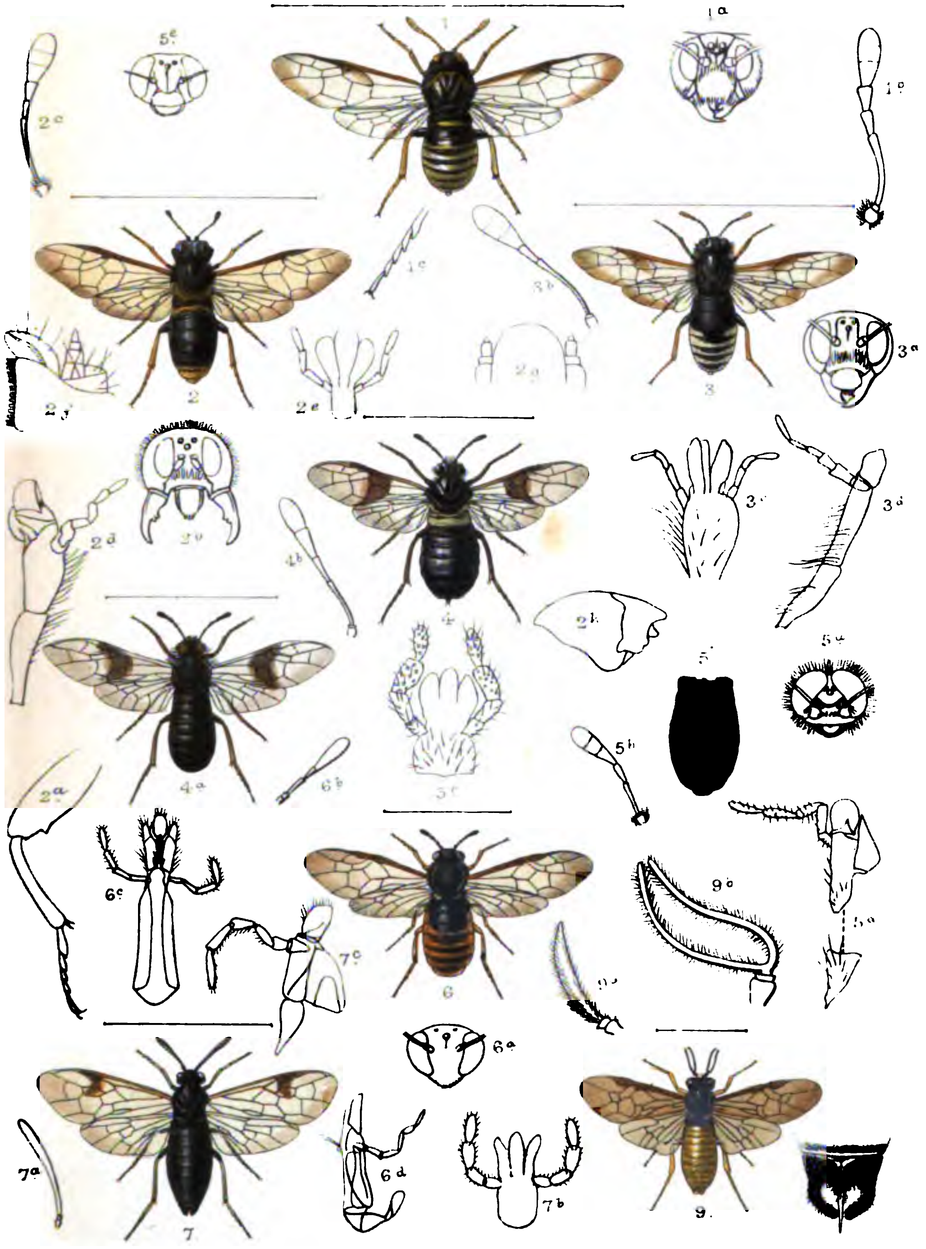

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PLATE VI.

Fig. 1.—*Lophyrus pini* ♀; 1 *a*, maxilla; 1 *b*, labium; 1 *c*, ovipositor; 1 *d*, sheath of ovipositor *a*, triangular; *b*, oblong plate; *c*, process of do; 1 *e*, antenna of ♀.

Fig. 2.—*Lophyrus pallipes* ♂.

Fig. 3.—*Pamphilius erythrocephalus* ♂; 3 *a*, base of antenna.

Fig. 4—*Pamphilius sylvarum* ♀; 4 *a*, antenna at base; 4 *b*, mandibles.

Fig. 5.—*Pamphilius flaviventris* ♀; 5 *a*, antenna at base.

Fig. 6.—*Pamphilius inanitus* ♀; 6 *a*, antenna at base; 6 *b*, leg.

Fig. 7.—*Pamphilius arbustorum* ♀; 7 *a*, antenna at base.

Fig. 8.—*Pamphilius depressus* ♀; sheath of ovipositor.

Fig. 10.—*Megalodontes plagiocephalus* ♀; 10 *a*, antenna; 10 *b*, maxilla; 8 *c* labium; 10 *d*, leg.

Fig. 11.—*Xyela Julii* ♂; 11 *a*, antenna; 11 *b*, ovipositor; *a*, saw; *b*, sheath; *c*, triangular plate; 11 *c*, mandibles; 11 *d*, palpus.

Phyto. Hymen. ii. Plate 6.

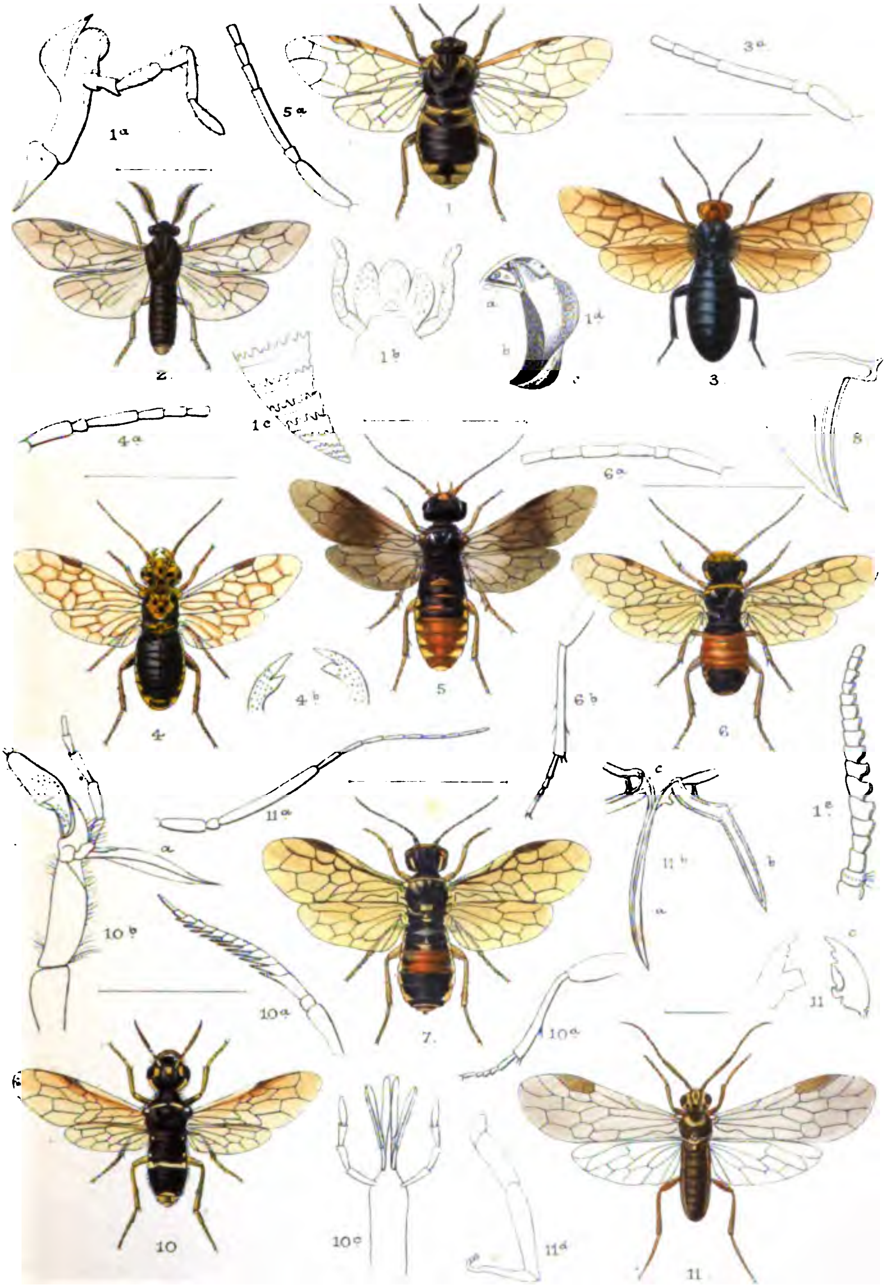

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PLATE VII.

Fig. 1.—*Cephus cynosbati* ♀; 1 *a*, mandibles; 1 *b*, labium; 1 *c*, maxillary palpus.

Fig. 2.—*Cephus linearis* ♂; 2 *a*, mandibles; 2 *b*, maxillary palpus; 2 *c*, labium.

Fig. 3.—*Cephus arundinis* ♀; 3 *a*, maxillary palpus; 3 *b*, ovipositor; *a*, cerci; *b*, oblong plate; *c*, attachment of do.; *d*, saw; *e*, triangular plate; *f*, hypopygium.

Fig. 4.—*Xiphidria dromedarius* ♀; 4 *a*, ovipositor; 1, hypopygium; 2, sheath; 3, borer; 4, triangular plate; 4 *b*, labium; 4 *c*, maxilla; 4 *d*, head, from the front; 4 *e*, mandible.

Fig. 5.—*Sirex juvencus* ♀; 5 *a*, prosternum; 5 *b*, pronotum (1), and prosternum (2); 5 *c*, mesopleura; 5 *d*, mesonotum from side and mesophragma; 5 *e*, mesonotum from front; 5 *f*, do. from behind the mesophragma; 5 *g*, metapleura; 5 *h*, metanotum; 1, cenchri; 2, fourth body segment.

Fig. 6.—*Sirex gigas* ♀; 6 *a*, ovipositor; 1, triangular plate; 2, oblong plate; 3, sheath of do.; 4, borer = saw of *Tenthredo;* 6 *b*, triangular and top of oblong plate from beneath; 6 *c*, apex of borer; 6 *d*, apex of last abdominal segment = hypopgium; 6 *e*, do. from above; 1, anus; 6 *f*, trophi; 1, maxilla; 2, labium.

Fig. 7.—*Sirex gigas* ♂.

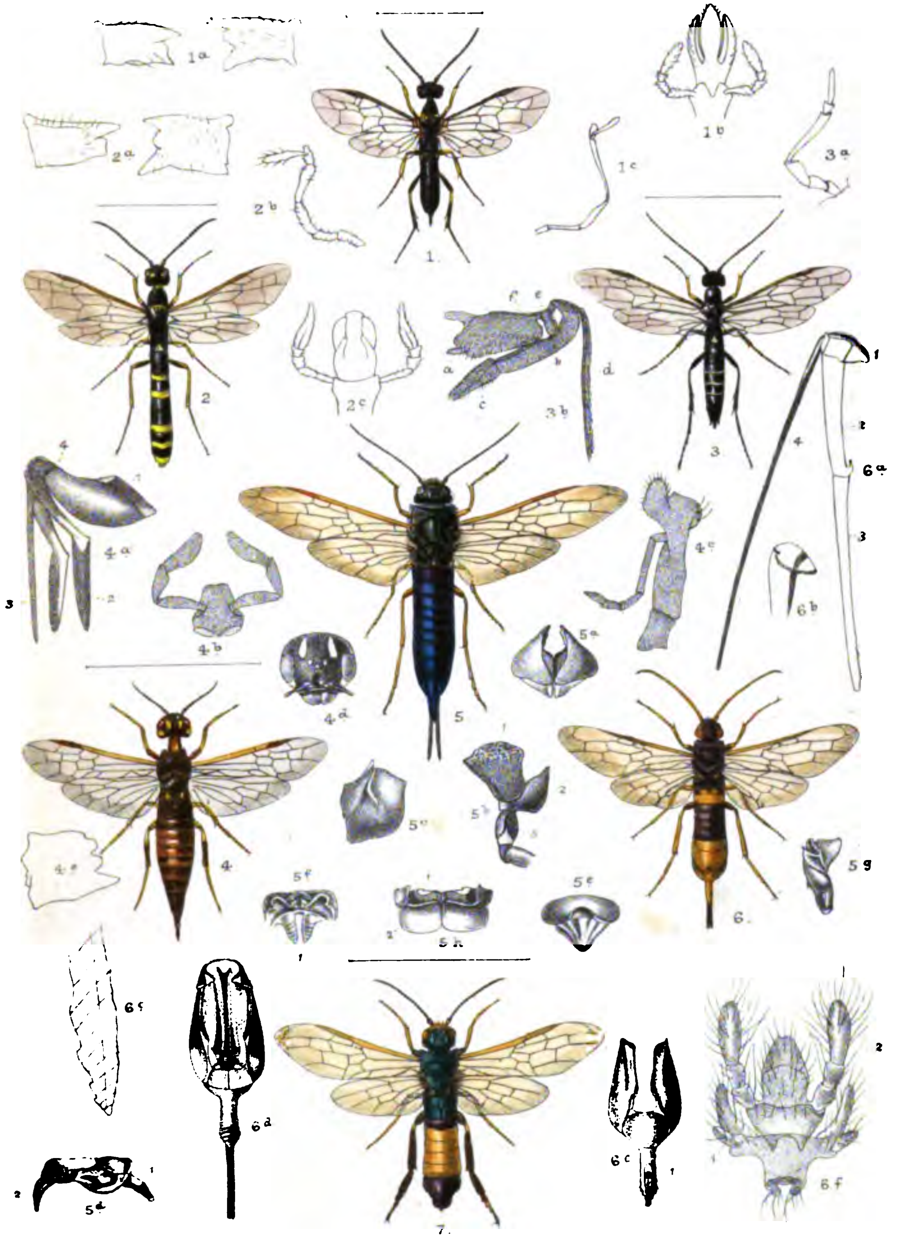

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PLATE VIII.

Fig. 1.—Larva of *Cladius pectinicornis;* 1 *a*, do. at moult.

Fig. 2.—Larva of *Hemichroa alni.*

Fig. 3.—Larva of *Nematus compressicornis.*

Fig. 4.—Larva of *Nematus appendiculatus;* 4 *a*, head.

Fig. 5.—Larva of *Nematus myosotidis;* 5 *a*, head; 5 *b*, segment from above; 5 *c*, from the side.

Fig. 6 ?—Larva of *Nematus* sp. on *Salix*; 6 *a*, segment and anal segment.

Fig. 7.—Larva of *Nematus salicivorus;* 7 *a*, head and anal segment.

Fig. 8.—Larva of *Nematus sylvestris.*

Fig. 9.—Larva of *Nematus flavescens;* 9 *a*, at last moult; 9 *b*, abdominal segment

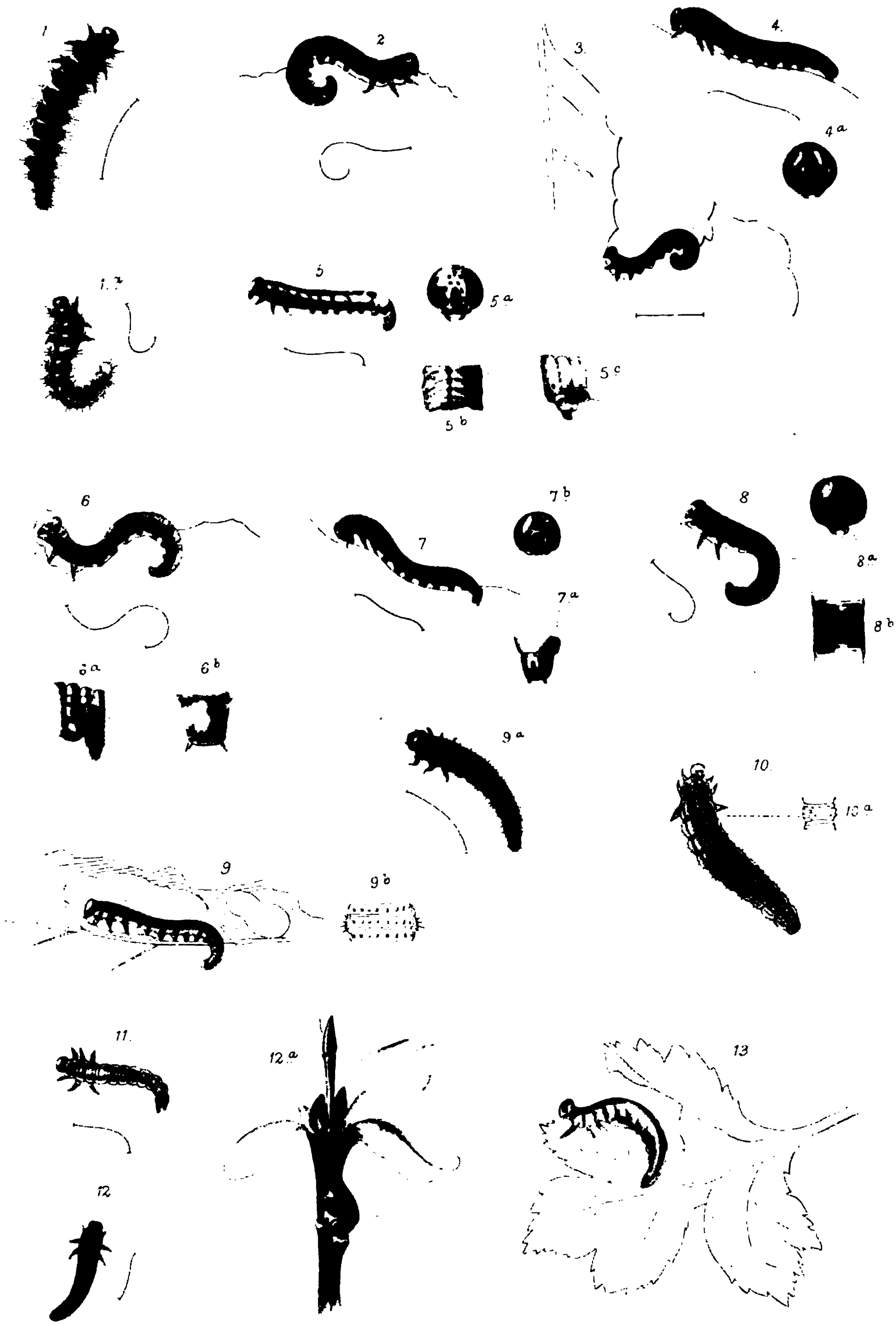
Fig. 10.—Larva of *Nematus bilineatus.*

Fig. 11.—Larva of *Euura pentandræ.*

Fig. 12.—Larva of *Euura nigritarsis;* 12 *a*, gall.

Fig. 13.—Larva of *Nematus* sp. on hawthorn.

Phyto. Hymen. ii Plate 8.



J. E. King & John Eadie del. ad nat.

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PLATE IX.

Fig. 1.—*Nematus Bridgmanii*, gall; 1 *a*, larva?

Fig. 2.—*Nematus lucidus*, larva.

Fig. 3.—*Nematus herbaceæ*, larva; 3 *a*, segment of do.; 3 *b*, gall.

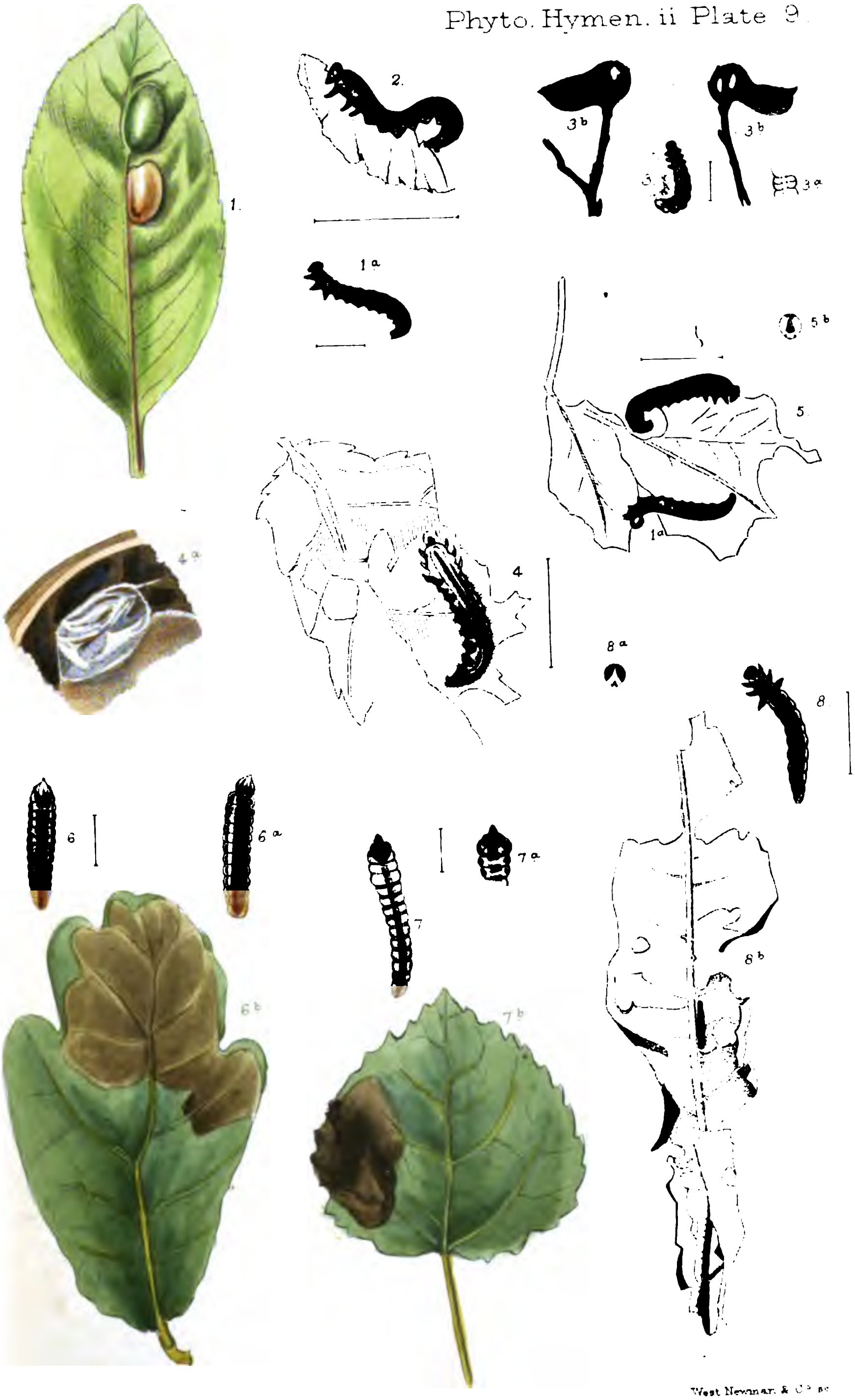
Fig. 4.—*Cladius rufipes*, larva; 4 *a*, cocoon.

Fig. 5.—*Nematus nigricollis*, larva; 1 *a*, nearly full fed; 5 *b*, head.

Fig. 6.—*Fenusa pygmæa*, larva from back; 6 *a*, from beneath; 6 *b*, mine.

Fig. 7.—*Phyllotoma ochropoda*, larva; 7 *a*, do. from underside; 7 *b*, mine.

Fig. 8.—*Nematus xanthogaster*, larva; 8 *a*, head of do; 8 *b*, leaf of willow rolled and eaten by larva.



John Eadie del. ad nat.

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PLATE X.

Fig. 1.—Larva of *Nematus pavidus;* 1 *a*, eggs.
Fig. 2.—Larva of *Nematus ruficornis.*
Fig. 3.—Larva of *Hylotoma ustulata;* 3 *a*, head from the front; 3 *b*, cocoon.
Fig. 4.—Larva of *Hylotoma gracilicornis;* 4 *a*, segment from the back enlarged.
Fig. 5.—Larva of *Nematus miliaris;* 2 *a*, eggs.
Fig. 6.—Larva of *Nematus ruficapillus.*

Phyto. Hymen. II. Plate 10.

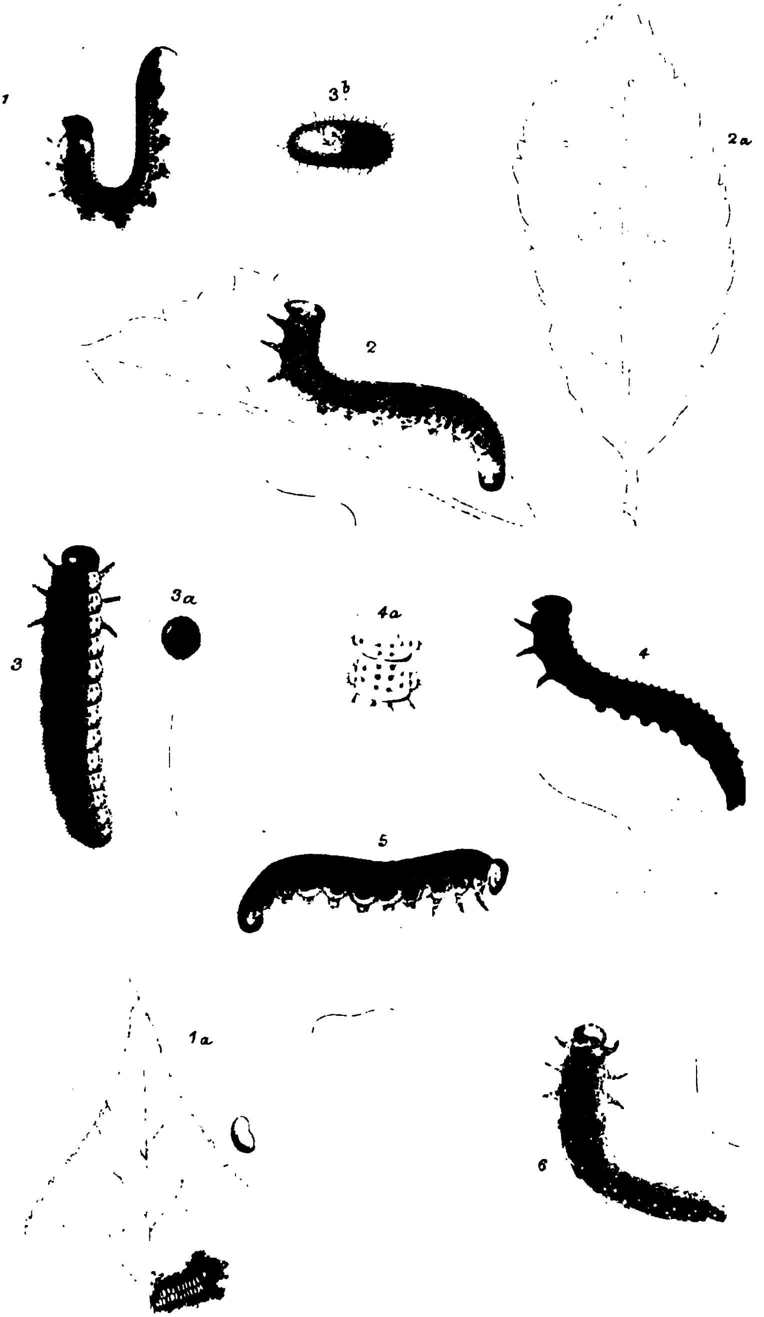

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PLATE XI.

Fig. 1.—Galls of *Euura pentandræ.*

Fig. 2.—Larva of *Nematus vesicator*

Fig. 3.—Larva of *Nematus cinereæ.*

Fig. 4.—Larva of *Nematus bellus?*

Fig. 5.—Larva of *Hylotoma berberidis* (after Brischke).

Fig. 6.—Larva of *Euura pentandræ,* full fed.

Fig. 7.—Leaf rolled by larva of *Nematus nigrolineatus.*

Fig. 8.—Larva of *Hylotoma rosæ* (after Brischke).

Fig. 9.—Larva of *Abia nitens.*

Fig. 10.—Larva of *Trichiosoma lucorum;* 10 *a* and 10 *b* head of do; 10 *c* and *d,* larva shortly before becoming a pupa.

Phyto. Hymen. ii Plate 11.

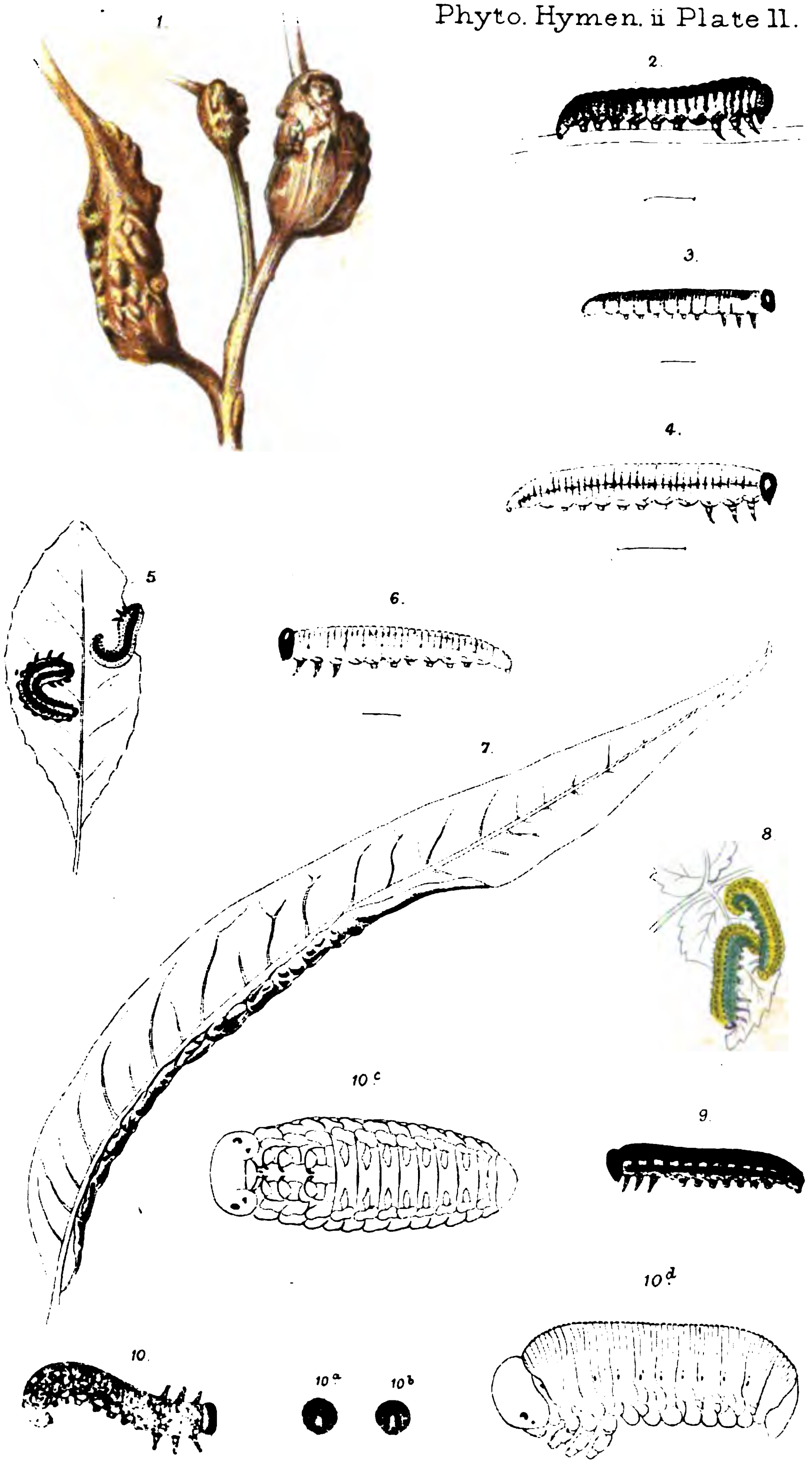

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PLATE XII.

Fig. 1.—Larva of *Trichiosoma betuleti;* 1 *a*, head; 1 *b*, tarsus.

Fig. 2.—Larva of *Trichiosoma Scalesii;* 2 *a*, young larva (after Brischke).

Fig. 3.—Larva of *Cimbex sylvarum.*

Fig. 4.—Cocoon of *Clavellaria amerinæ.*

Fig. 5.—Cocoon of *Cimbex lutea.*

Fig. 6.—Larva of *Cimbex lutea.*

Fig. 7.—Larva of *Lophyrus pini.*

Fig. 8.—Larva of *Pamphilius* on rose, *P. arbustorum?*

Fig. 9.—Larva of *Lophyrus pallidus.*

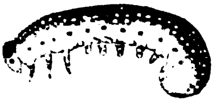
Fig. 10.—Larva of *Pamphilius* on rose, *P. arbustorum?*

Fig. 11.—Cocoon of *Lophyrus pini.*

Fig. 12.—Larva of *Pamphilius flaviventris;* 12 *a*, head; 12 *b*, cerci.

Fig. 13.—Case of larva of *Pamphilius inanitus* (after Westwood).

1a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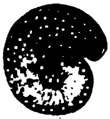
1b

2a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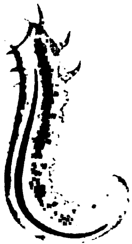
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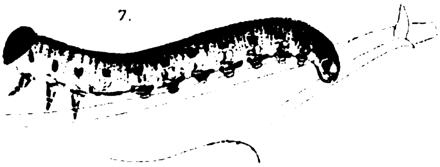
4a

4

5.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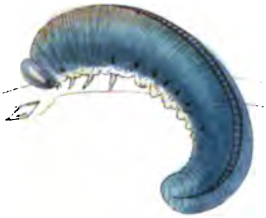
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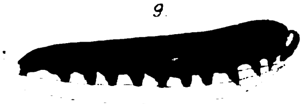
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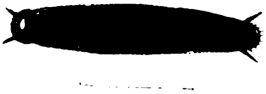
8a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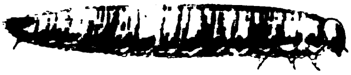
10.

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12a

13.

12b

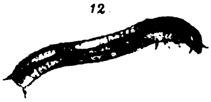
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PLATE XIII.

Fig. 1.—Larva of *Abia fasciata;* 1 *a*—*c*, trophi.

Fig. 2.—Larva of *Emphytus tibialis.*

Fig. 3.—Larva of *Tenthredo balteata;* 3 *a*—*b*, trophi; 3 *c*, segment; 3 *d*, in last moult.

Fig. 4.—Larva of *Tenthredo punctulata;* 4 *a*, in last moult.

Fig. 5.—Larva of *Dolerus palustris;* 5 *a*, head; 5 *b*, anal segment.

Fig. 6.—Larva of *Eriocampa varipes;* 6 *a*, head.

Fig. 7.—Larva of *Hoplocampa testudinea.*

Fig. 8.—Larva of *Fenusa hortulana.*

Phyto. Hymen. ii. Plate 13.

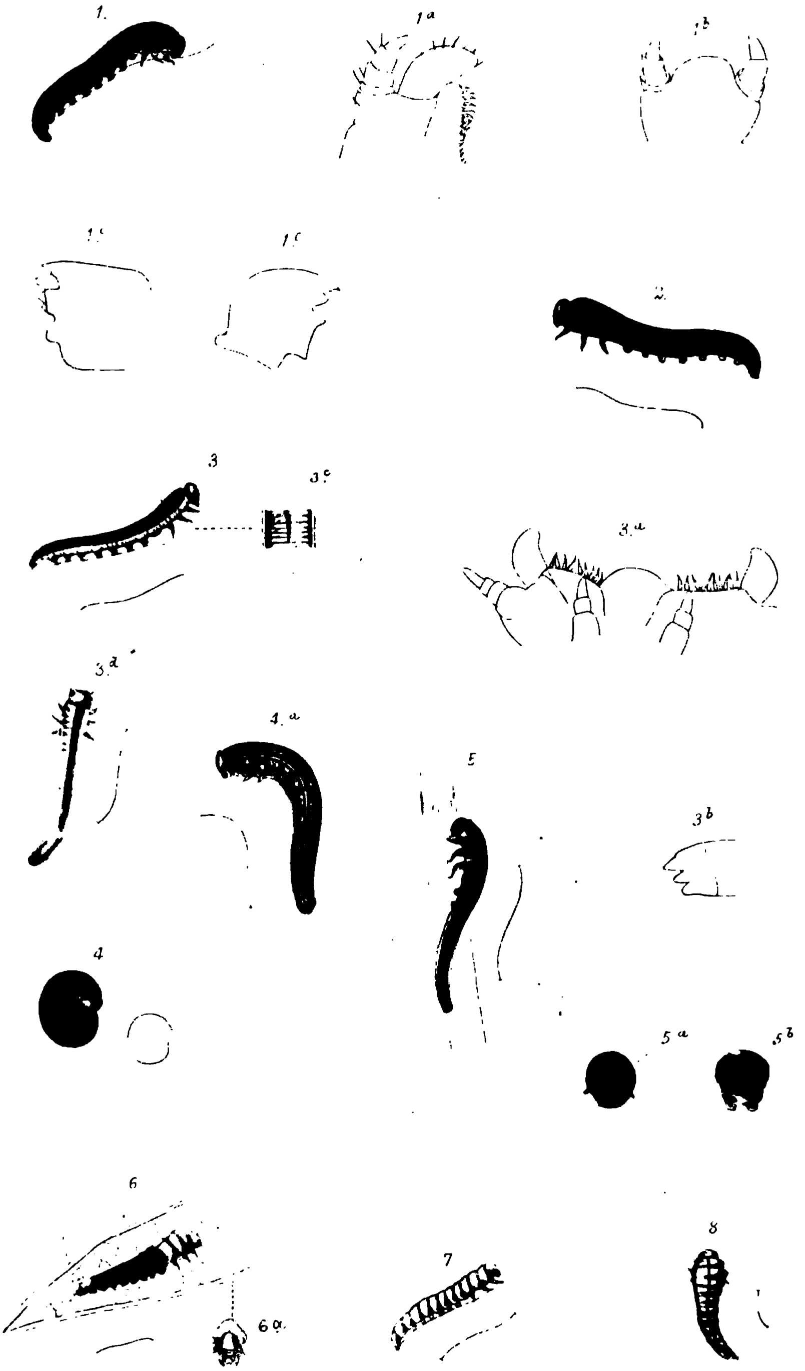

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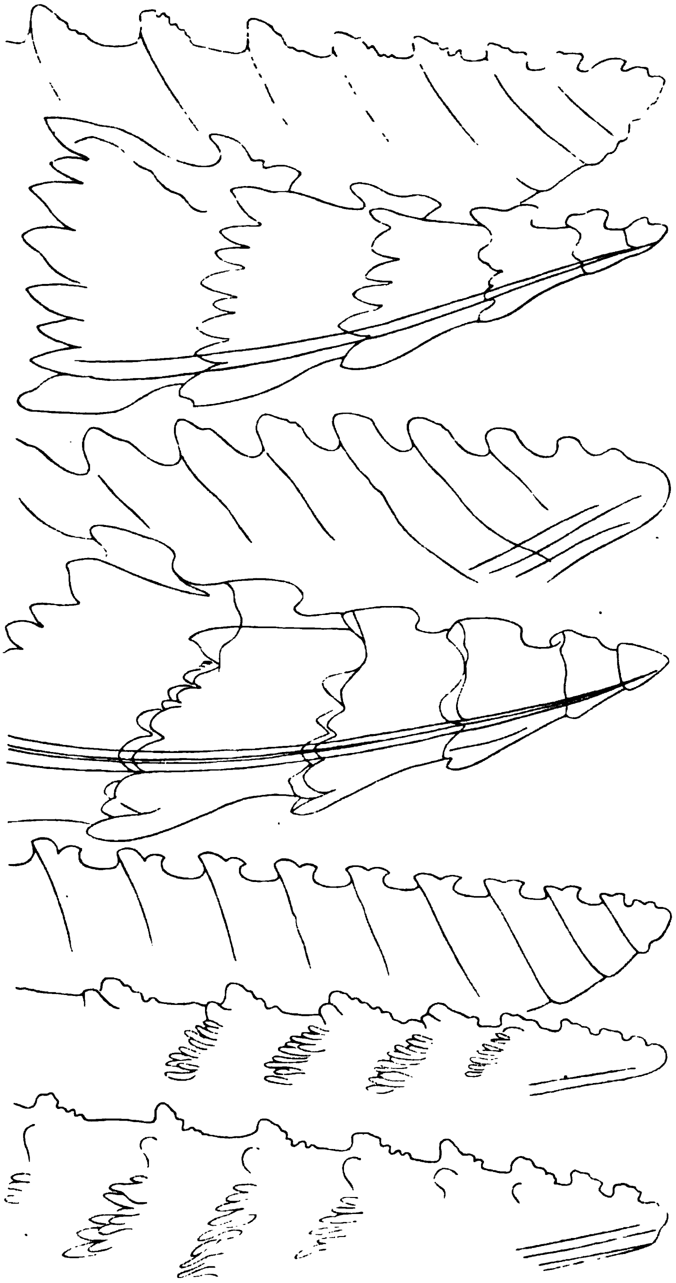
PLATE XIV.

Fig. 1.—Saw of *Cladius viminalis.*
Fig. 2.—Saw of *Cladius Brullæi.*
Fig. 3.—Saw of *Cladius eradiatus.*
Fig. 4.—Saw of *Cladius pectinicornis.*
Fig. 5.—Saw of *Cladius rufipes.*
Fig. 6.—Saw of *Dineura stilata.*
Fig. 7.—Saw of *Dineura testaceipes.*

The figures of the saws are magnified × 200.

Phyto Hymen ii Plate 14.



W. Purkiss lith.

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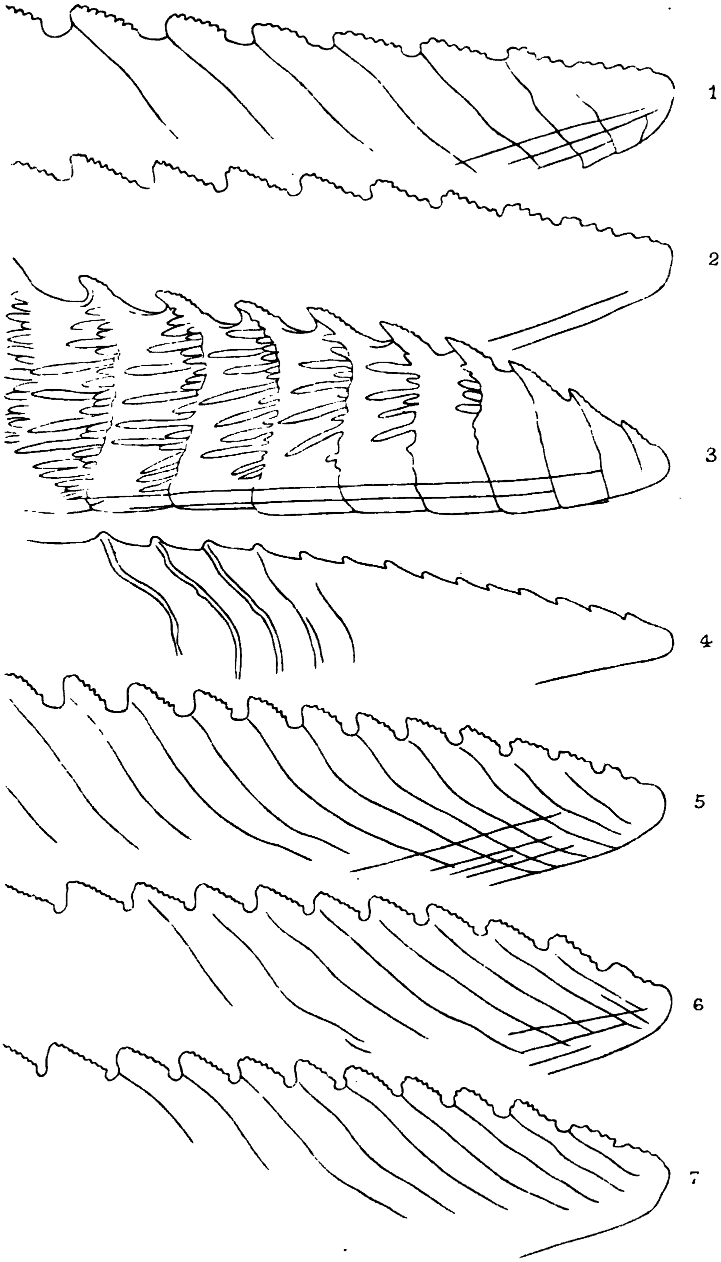
PLATE XV.

Fig. 1.—Saw of *Nematus Erichsoni.*
Fig. 2.—Saw of *Nematus quercûs.*
Fig. 3.—Saw of *Nematus appendiculatus.*
Fig. 4.—Saw of *Nematus hibernicus.*
Fig. 5.—Saw of *Nematus ruficornis.*
Fig. 6.—Saw of *Nematus Fletcheri.*
Fig. 7.—Saw of *Nematus nigricollis.*

The figures of the saws are magnified × 200.

Phyto Hymen ii Plate 15.



W. Purkiss lith.

West Newman & Co imp.

UNI

PLATE XVI.

Fig. 1.—Saw of *Nematus puncticeps.*
Fig. 2.—Saw of *Nematus alnivorus* (*fulvipes*).
Fig. 3.—Saw of *Nematus compressicornis.*
Fig. 4.—Saw of *Nematus leucostigma.*
Fig. 5.—Saw of *Nematus ambiguus* (× 150); 5 *a*, cross teeth enlarged to × 300.
Fig. 6.—Saw of *Nematus scoticus.* × 150.

The figures of the saws are magnified × 200, unless otherwise noted.

Phyto. Hymen. ii. Plate 16.

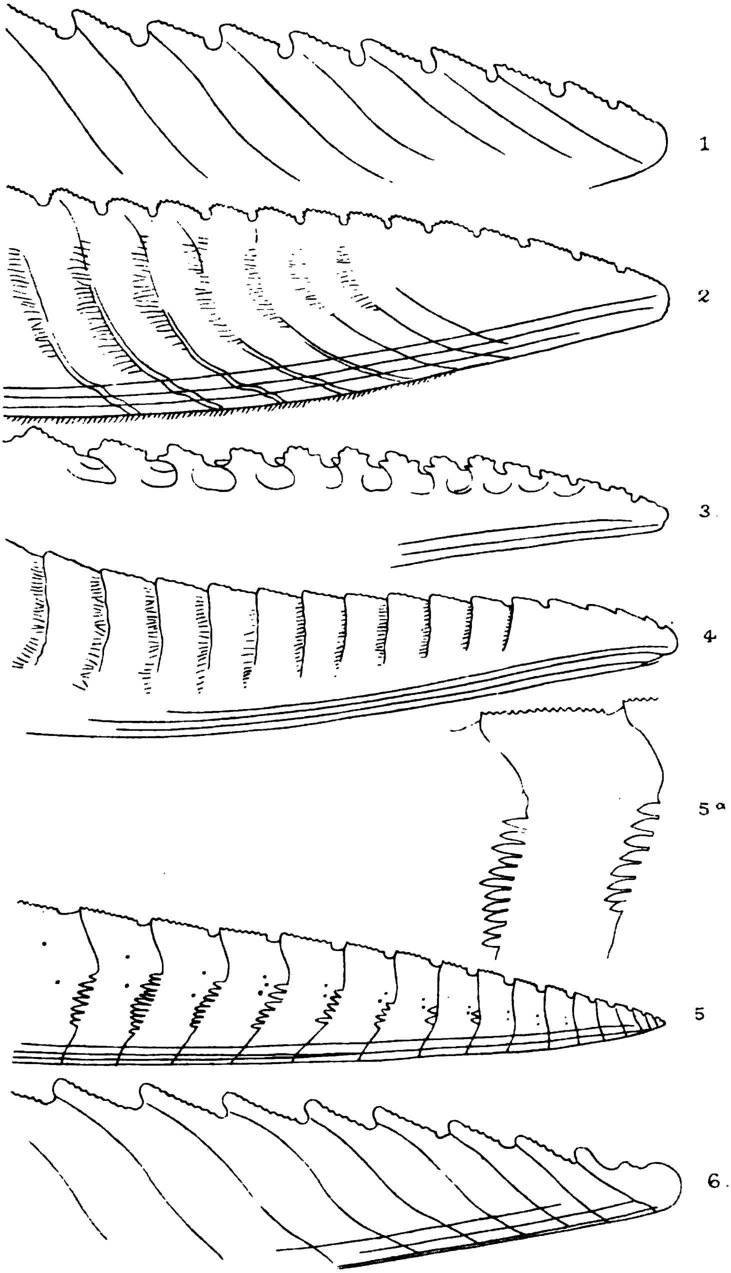


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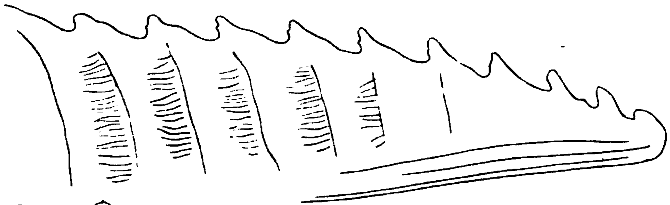
PLATE XVII.

Fig. 1.—**Saw** of *Nematus mollis*. × 150.
Fig. 2.—**Saw** of *Nematus breadalbanensis*. × 150.
Fig. 3.—**Saw** of *Nematus astutus*.
Fig. 4.—**Saw** of *Nematus lativentris*. × 150.
Fig. 5.—**Saw** of *Nematus cæruleocarpus*.
Fig. 6.—**Saw** of *Nematus crassus*.

The figures of the saws are magnified × 200, unless otherwise noted.

Phyto. Hymen. ii. Plate 17.



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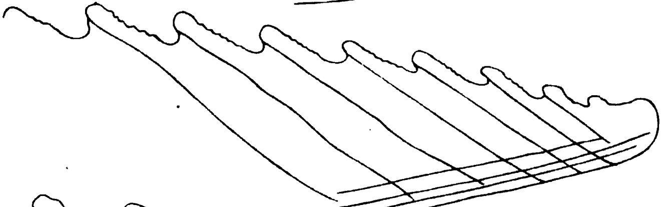

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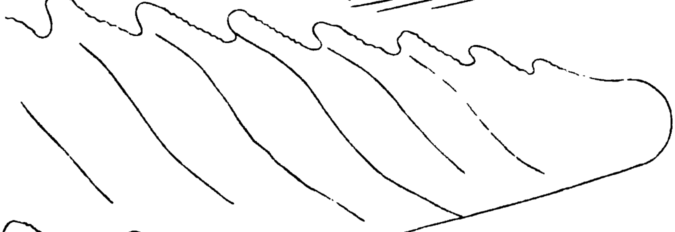

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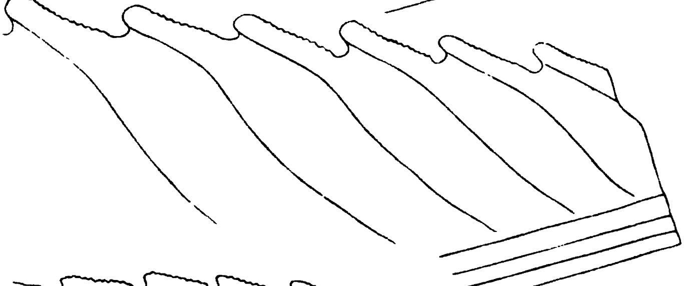

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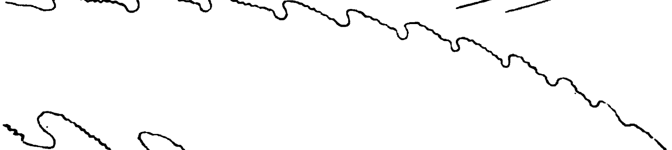

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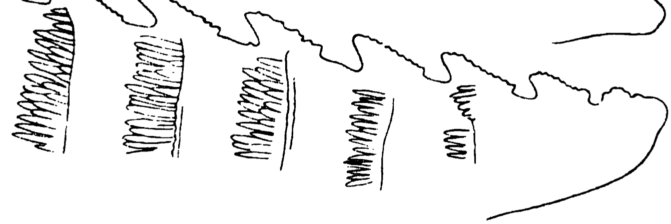

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West, Newman & C^o imp.

PLATE XVIII.

Fig. 1.—Saw of *Nematus lucidus.* × 300.
Fig. 2.—Saw of *Nematus Thomsoni.*
Fig 3.—Saw of *Nematus apicalis.*
Fig. 4.—Saw of *Nematus histrio.*
Fig. 5.—Saw of *Nematus glenelgensis.*
Fig. 6.—Saw of *Nematus hæmorrhoidalis.*

The figures of the saws are magnified × 200, unless otherwise noted.

Phyto. Hymen. ii. Plate 18.

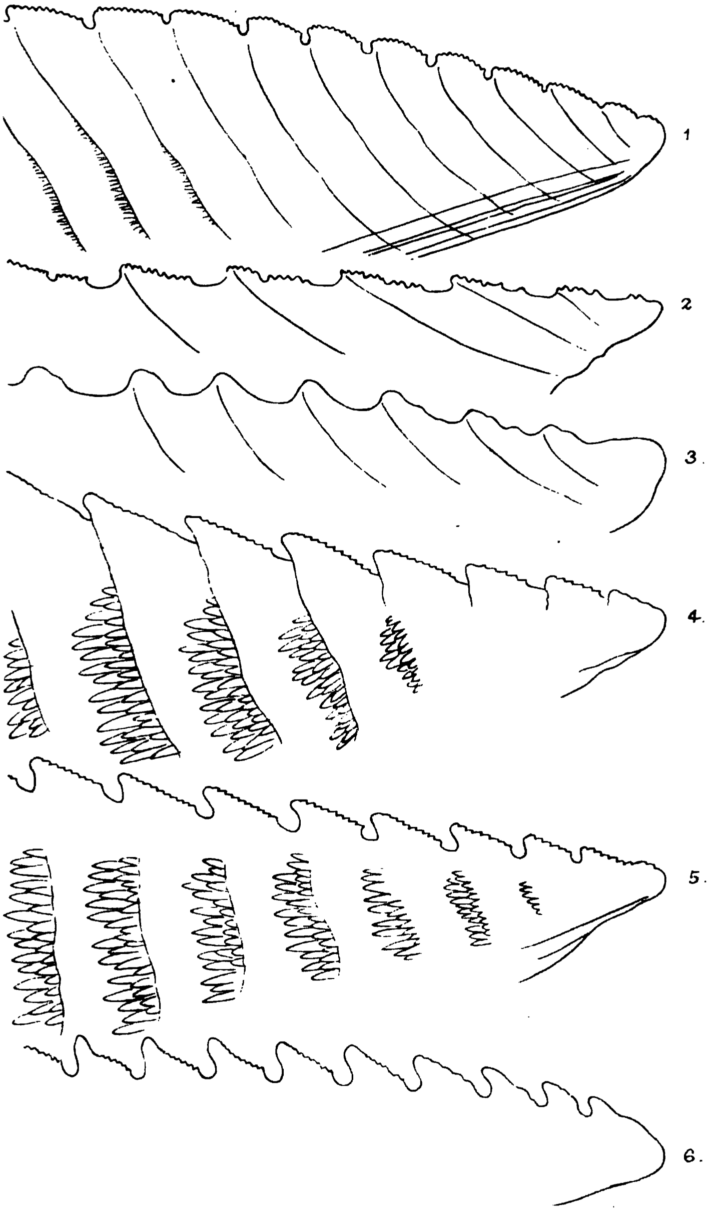

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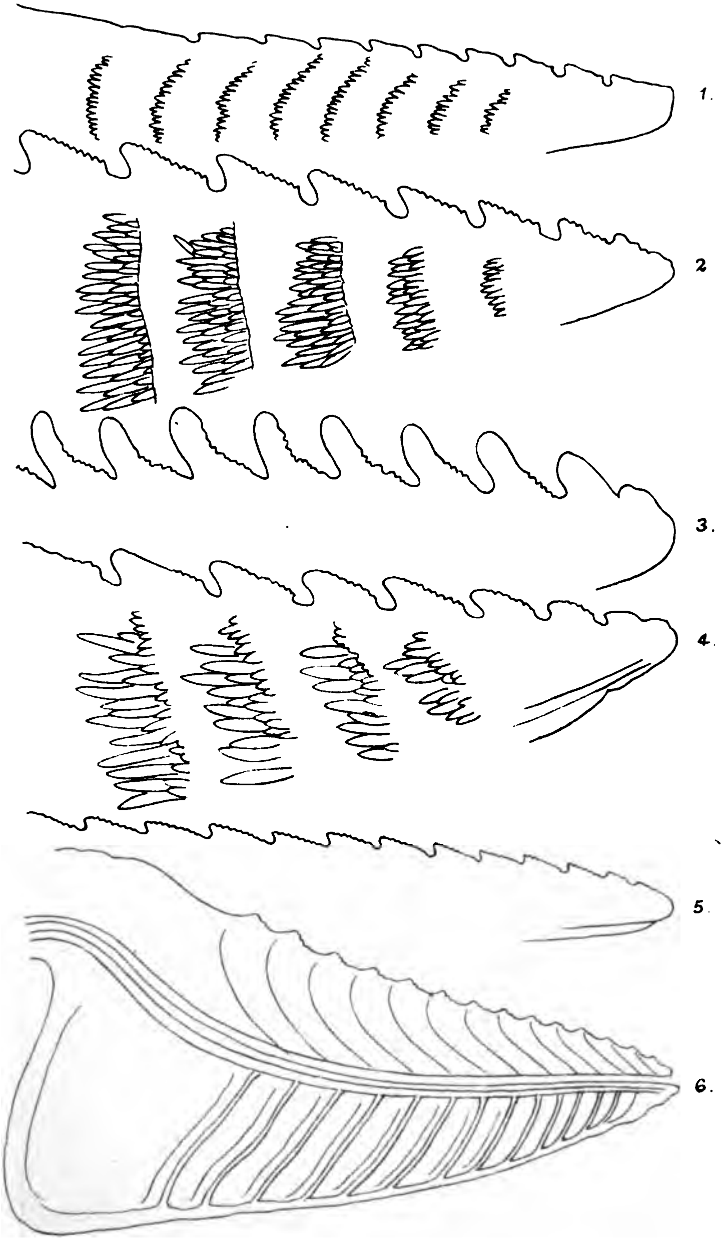
PLATE XIX.

Fig. 1.—Saw of *Nematus longiserra.*
Fig. 2.—Saw of *Nematus humeralis.*
Fig. 3.—Saw of *Nematus imperfectus.*
Fig. 4.—Saw of *Nematus canaliculatus.*
Fig. 5.—Saw of *Nematus placidus.*
Fig. 6.—Saw of *Nematus capreæ.*

The figures of the saws are magnified × 200.

Phyto. Hymen. ii. Plate 19.



W. Purkiss lith.

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PLATE XX.

Fig. 1.—Saw of *Nematus turgidus*.
Fig. 2.—Saw of *Nematus conductus*. (× 150.)
Fig. 3.—Saw of *Nematus obductus*.
Fig. 4.—Saw of *Nematus leucogaster*.
Fig. 5.—Saw of *Nematus pulchellus*.
Fig. 6.—Saw of *Nematus maculiger*.
Fig. 7.—Saw of *Nematus lacteus*.
Fig. 8.—Saw of *Nematus palliatus*.

The figures of the saws are magnified × 200, unless otherwise noted.

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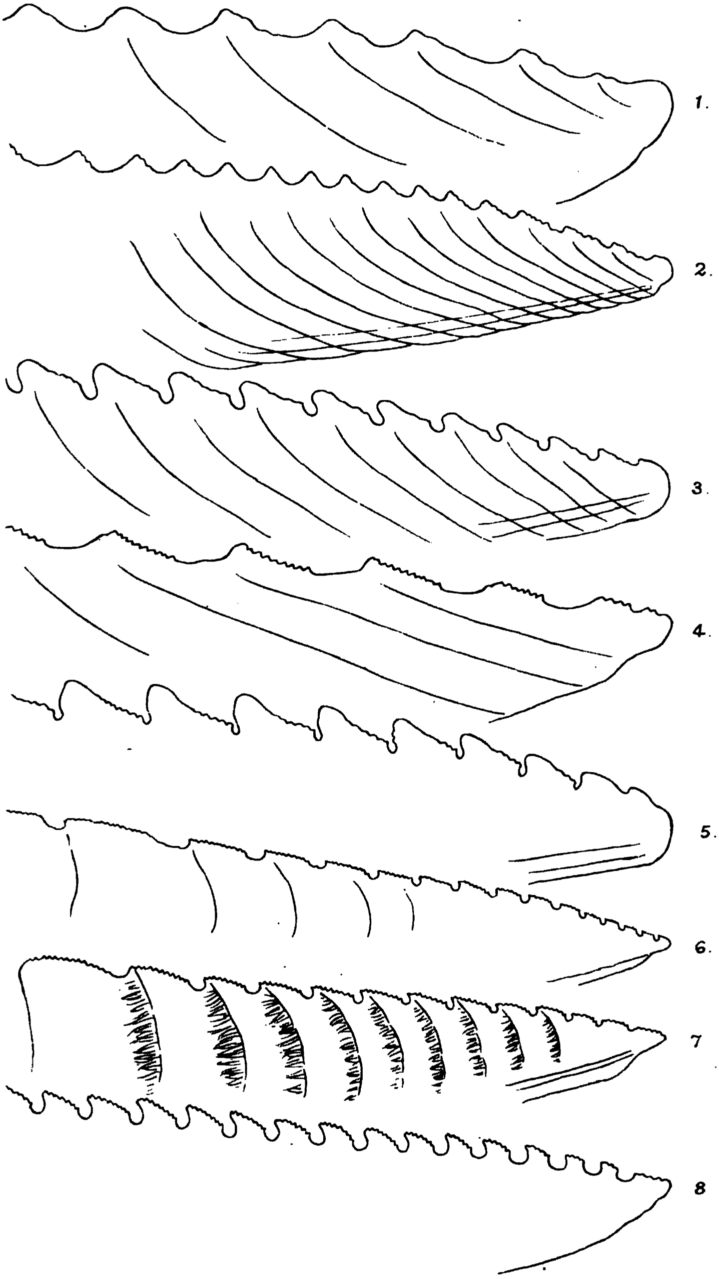

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PLATE XXIII.

Fig. 1.—Saw of *Nematus subbifidus*.
Fig. 2.—Saw of *Nematus conjugatus*.
Fig. 3.—Saw of *Nematus dorsatus*.
Fig. 4.—Saw of *Nematus cadderensis*.
Fig. 5.—Saw of *Nematus croceus*.
Fig. 6.—Saw of *Nematus flavescens*.
Fig. 7.—Saw of *Nematus abdominalis*. × 70.
Fig. 8.—Saw of *Nematus ruficapillus*. × 70.

The figures of the saws are magnified × 200, unless otherwise noted.

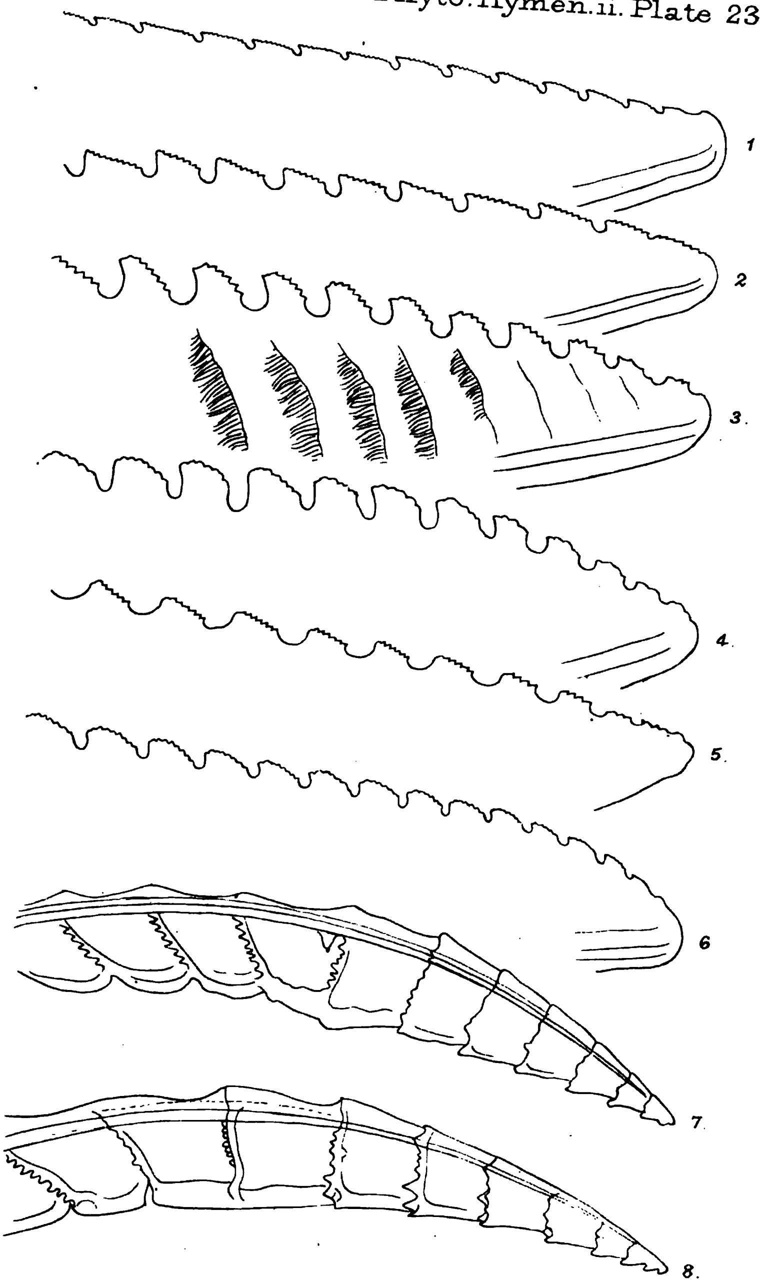

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PLATE XXIII.

Fig. 1.—Saw of *Nematus subbifidus.*
Fig. 2.—Saw of *Nematus conjugatus.*
Fig. 3.—Saw of *Nematus dorsatus.*
Fig. 4.—Saw of *Nematus cadderensis.*
Fig. 5.—Saw of *Nematus croceus.*
Fig. 6.—Saw of *Nematus flavescens.*
Fig. 7.—Saw of *Nematus abdominalis.* × 70.
Fig. 8.—Saw of *Nematus ruficapillus.* × 70.

The figures of the saws are magnified × 200, unless otherwise noted.

Phyto. Hymen. ii. Plate 23.

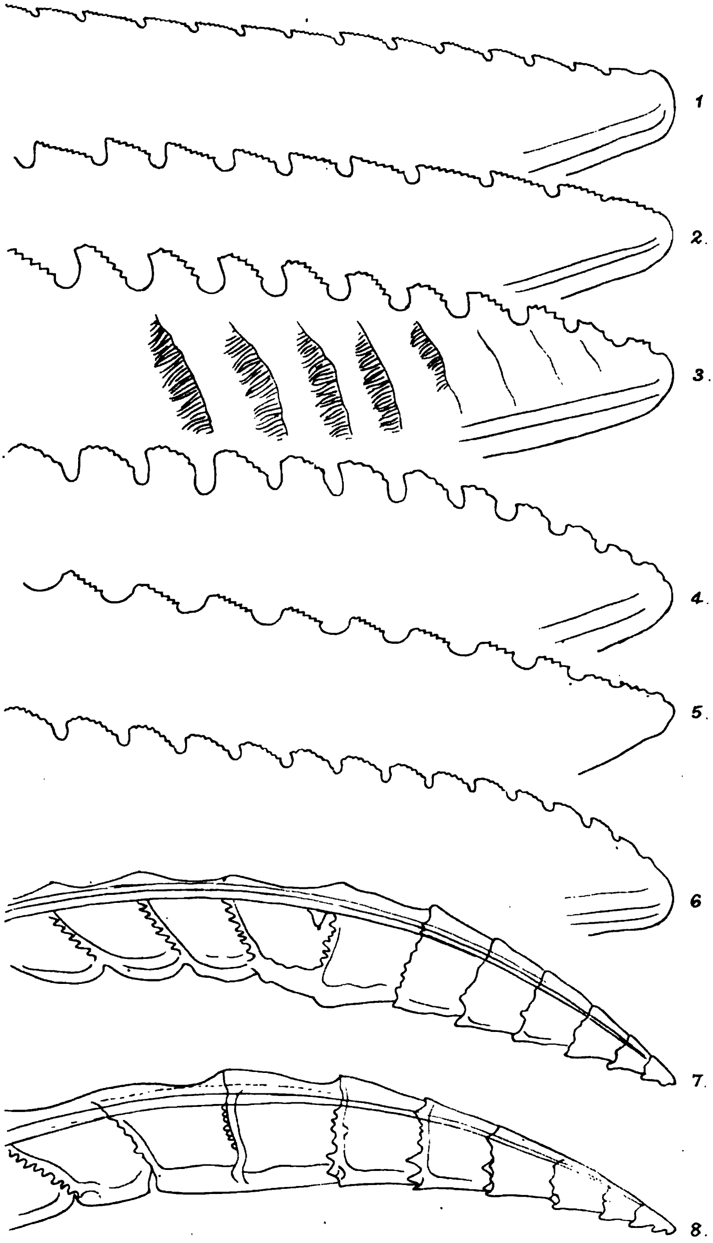

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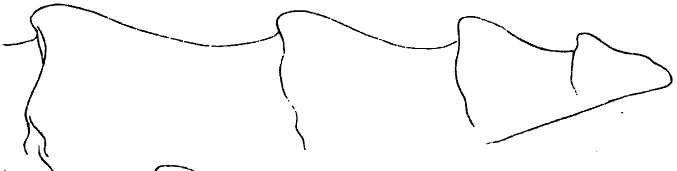
PLATE XXIV.

Fig. 1.—Saw of *Nematus acuminatus.*
Fig. 2.—Saw of *Nematus caledonicus.*
Fig. 3.—Saw of *Nematus bilineatus.*
Fig. 4.—Saw of *Nematus antennatus.* × 70.
Fig. 5.—Saw of *Nematus salicis.*
Fig. 6.—Saw of *Nematus melanocephalus.*
Fig. 7.—Saw of *Nematus collinus.*

The figures of the saws are magnified × 200, unless otherwise noted.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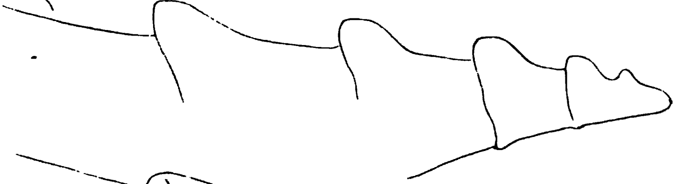
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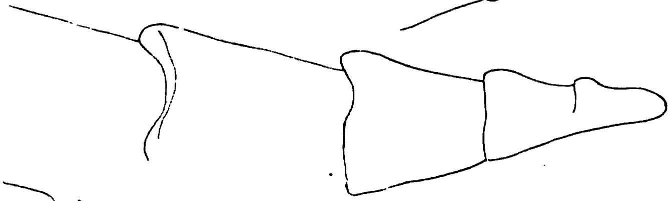
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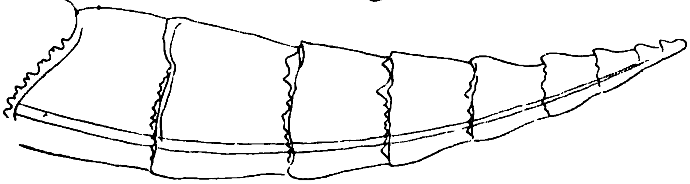
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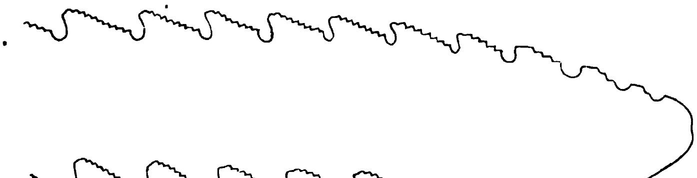
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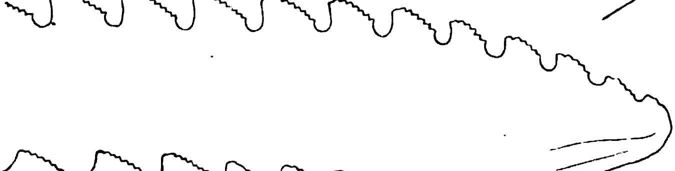
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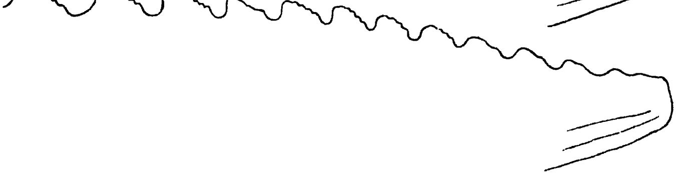
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PLATE XXV.

Fig. 1.—Saw of *Nematus ribesii.*
Fig. 2.—Saw of *Nematus pavidus.*
Fig. 3.—Saw of *Nematus albipennis.*
Fig. 4.—Saw of *Nematus bipartitus.*
Fig. 5.—Saw of *Nematus rumicis.*
Fig. 6.—Saw of *Nematus arcticus.*
Fig. 7.—Saw of *Nematus vesicator.*

The figures of the saws are magnified × 200.

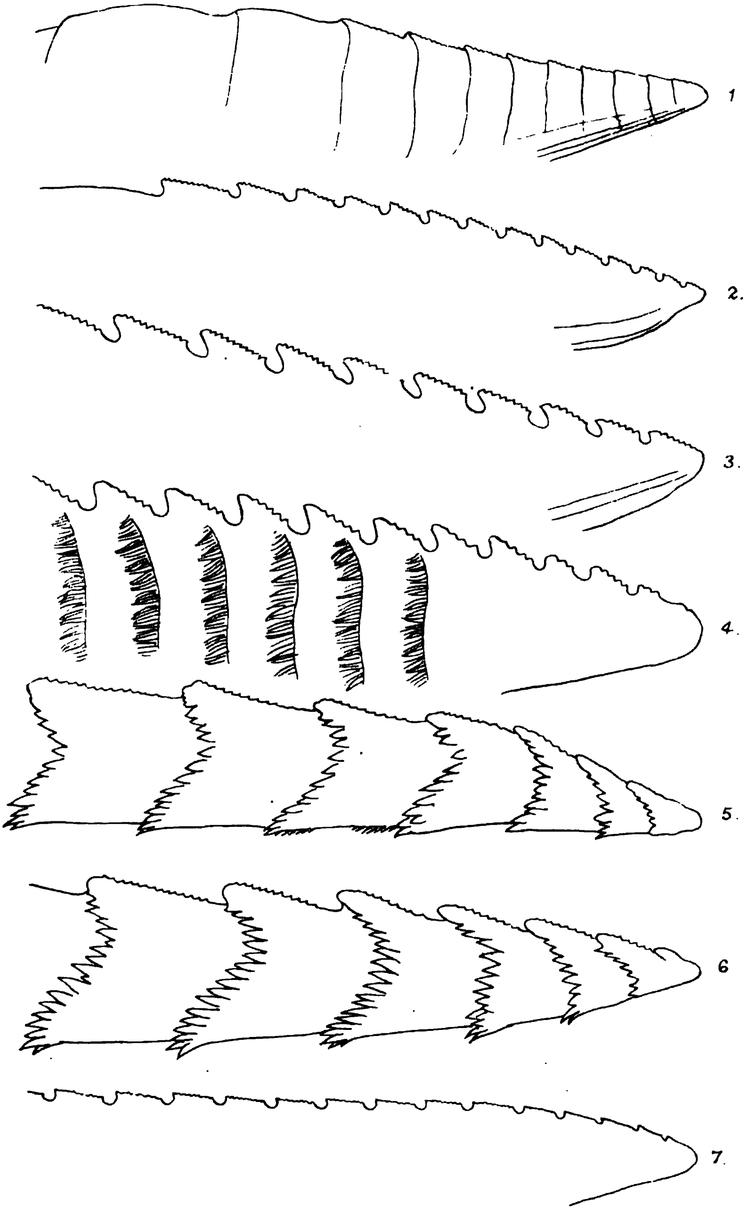

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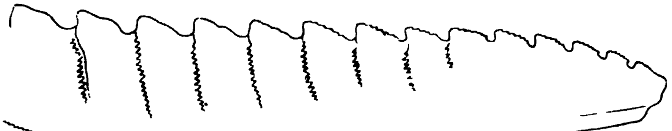
PLATE XXVI.

Fig. 1.—Saw of *Nematus scotaspis.*
Fig. 2.—Saw of *Nematus leucostictus.*
Fig. 3.—Saw of *Nematus ischnocerus.*
Fig. 4.—Saw of *Nematus nigrolineatus.*
Fig. 5.—Saw of *Nematus gallicola* × 300.
Fig. 6.—Saw of *Nematus curticornis.*
Fig. 7.—Saw of *Nematus herbaceæ* × 300.
Fig. 8.—Saw of *Nematus Bridgmanii.*
Fig. 9.—Saw of *Euura flavipes* × 300.
Fig. 10.—Saw of *Euura nigritarsi* × 300.

The figures of the saws are magnified × 200, except otherwise noted.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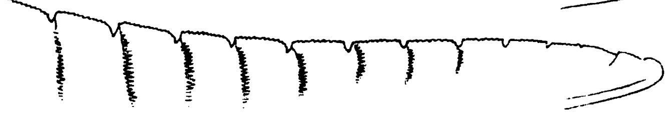
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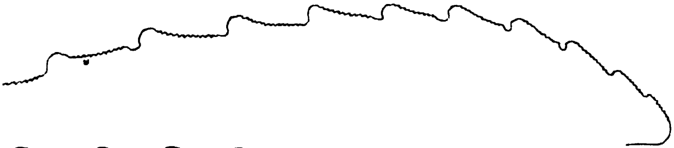
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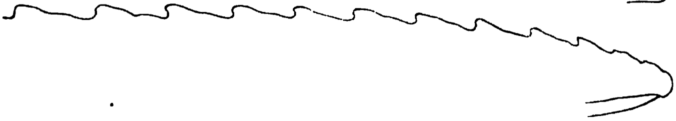
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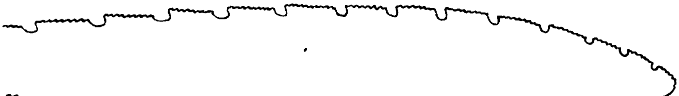
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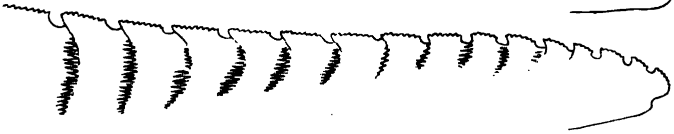
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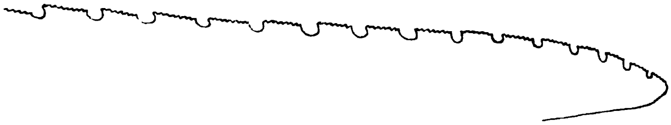
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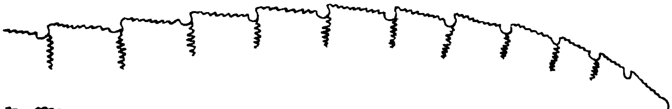
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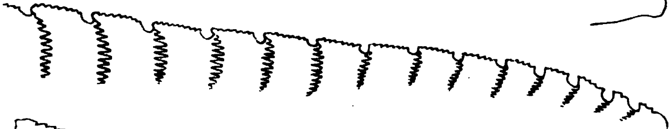
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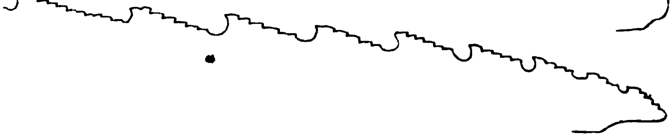
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PLATE XXVII.

Fig. 1.—*Hemichroa alni*, maxilla; 1 *a*, labium; 1 *b*, 1 *c*, mandibles of larva.

Fig. 2.—*Dineura viridiḍorsata*, maxilla; 2 *a*—*b*, mandibles of larva.

Fig. 3.—*Cladius padi*, maxilla and labium; 3 *a*, mandible; 3 *b*, clypeus of larva.

Fig. 4.—*Camponiscus luridiventris*, maxilla; 4 *a* and *b*, mandibles of larva.

Fig. 5.—*Crœsus septentrionalis*, maxilla of larva.

Fig. 6.—*Nematus ribesii*, maxilla; 6 *a*, mandible of larva.

Fig. 7.—*Nematus abdominalis*, maxilla; 7 *a*, labium; 7 *b* and *c*, mandibles of larva.

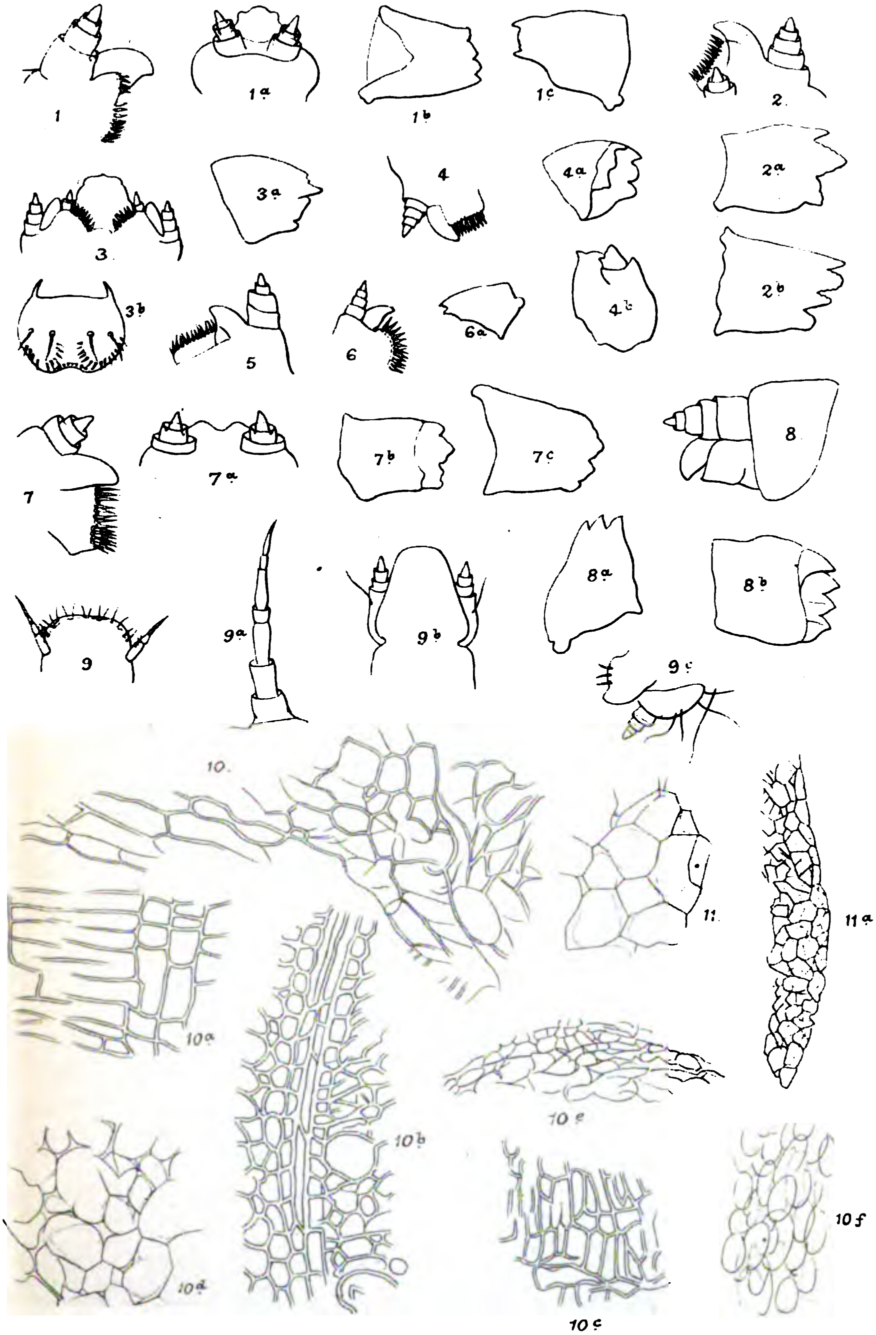
Fig. 8.—*Lophyrus pini*, maxilla; 8 *a* and *b*, mandibles of larva.

Fig. 9.—*Pamphilius flaviventris*, cerci; 9 *a*, antenna; 9 *b*, labium; 9 *c*, maxilla of larva.

Fig. 10.—*Euura pentandræ*, structure of gall. 10 *a*—*c*, woody parts of galls; 10 *d*—*f*, cellular central portion.

Fig. 11.—*Nematus cinereæ*, structure of gall, central, 11 *a*, peripheral part of gall.

Phyto. Hymen. ii. Plate 27.



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